

Memo

To: Barbara Sharrow
From: Amanda Clements
Date: July 27, 2012

The attached report describes the findings of the Land Health Assessment for the Gunnison Gorge Unit. The assessment was based on permanent upland and riparian monitoring transects, bird inventories, water quality and macroinvertebrate sampling. This data was used to reevaluate Land Health determinations and to determine trends in indicators throughout the unit. The report contains acreages meeting and not meeting the standards, types and locations of problems occurring on the land, and recommendations for addressing the problems. This report should be used and referenced in the NEPA analysis of all subsequent actions occurring in the Gunnison Gorge Landscape Unit.

I concur that this report constitutes the Land Health Assessment for the Gunnison Gorge unit and fulfills the requirements for an evaluation of the landscape unit relative to the Colorado Land Health Standards.



Barbara Sharrow, Field Office Manager

Date: 8-22-12

Gunnison Gorge Land Health Assessment

2011-2012

Bureau of Land Management
Uncompahgre Field Office



Executive Summary

Land Health status and trend within the Gunnison Gorge unit was reevaluated in 2011 and 2012. This area was first evaluated in 2000-2001. This assessment continues a new approach intended to be more quantitative, repeatable, and efficient. It is also expanded to address the variety of activities and uses that occur on the public lands. The goal of this approach is to improve the link between determinations of land health and trend, identification of causal and contributing factors, and development of remedies. The desired result is to facilitate improved management for land health.

To support the new approach, this document is formatted to provide key information relating to Land Health Determinations, Causal Factors, and Remedies to address land health problems. A description of the LHA study methods and a broad overview of the Gunnison Gorge area add context. A discussion of past actions in the Adaptive Management section is also included. Detailed information covering the existing environment, study results, data summaries, and development surveys is provided in the Appendix.

The updated Land Health determinations show that 44% of the nearly 103,000 acres of public land in the Gunnison Gorge unit fully meet Colorado's Standards for Public Land Health, and another 37% meet the Standards with some problems. Some 14% of lands do not meet Health Standards. Much of this acreage is on the western and northern slopes of the unit, in the fragile salt-desert shrub and mancos shale landscape. Compared to the 2001 Land Health Determinations, more land is now determined to meet standards, more land is also classified as not meeting, while less land is in the meeting with problems category. Some of this change is due to changing conditions in the field, and some of the change is a result of the assessment and efforts to improve mapping and data collection.

The Land Health Standards are analyzed separately in order to better identify the nature of land health issues and trends. The majority of lands in the Gunnison Gorge unit meet Standard 1 (soils). Streams (Standard 2) show mixed results with some healthy systems, and some having problems with riparian vegetation and channel characteristics. While a substantial acreage fully meets Standard 3 (plant and animal communities), there are widespread problems relating to exotic plants and native plant composition and abundance. Standard 4 (Threatened, Endangered, and Sensitive Species) was evaluated for both uplands and streams. Rare plant habitat is afflicted by the same issues noted for Standard 3. Sensitive fish habitat reflects the same concerns as Standard 2 in addition to temperature impacts to warm water TES fish species. Nearly all streams meet Standard 5 (water quality), with the exception of one stream that has very high salts resulting from irrigation return flow through mancos shales. At a landscape level, most of these findings do not reflect major shifts from conditions found ten years ago during the first Land Health Assessment, with the same general areas showing land health problems. Determinations for Standards 4 and 5 show the biggest changes over the past ten years, largely due to growing concerns about weed threats to sensitive plant habitat, and the collection of water quality data instead of reliance on soil data.

2011-2012 Land Health Determinations for the Gunnison Gorge LHA unit.

Percentage figures for Standard 2 and Standard 5 show the land health determinations as a proportion of the total riparian and stream channel area.

	Lands and Streams Meeting (acres / % of unit)	Lands and Streams Meeting with Problems (acres / % of unit)	Lands and Streams Not Meeting (acres / % of unit)	Not Evaluated or Not Applicable (acres / % of unit)
All Standards	44,889 / 44%	38,256 / 37%	14,506 / 14%	5,275 / 5%
Standard 1	84,330 / 82%	11,834 / 11%	382 / 0.4%	6,379 / 7%
Standard 2*	582 / 38%	539 / 34%	0 / 0%	445 / 28%
Standard 3	55,755 / 53%	29,565 / 29%	11,226 / 11%	6,379 / 7%
Standard 4	51,234 / 50%	33,627 / 33%	12,805 / 12%	5,258 / 5%
Standard 5*	1,052 / 64%	0 / 0%	52 / 3%	573 / 33%

In addition to updating the LHA determinations, this assessment focuses on evaluation of trend for each of the Land Health Standards. Trend information is particularly important for lands which are not meeting a standard, or meeting with problems. For Standard 1, soil indicator trends are generally downward or static in the lands of concern. Standard 2 riparian indicator trends are also downward or static for streams of concern. Standard 3 vegetation indicator trends are balanced between downward, static and upward for lands meeting with problems, but static or downward for lands not meeting this standard. Trends for Standard 4 sensitive species indicators show the same pattern as with Standard 3. Trend information for Standard 5 is currently limited to waters which meet Standard 5.

A major focus of the Determinations section is to highlight the nature of land health concerns so that appropriate management solutions can be identified. Developments are also analyzed in this document to identify how they may be influencing land health. The Land Health Determinations are based on results of upland and riparian biological studies that are located throughout the Gunnison Gorge Unit, but intentionally placed away from developments and site specific disturbances such as roads or livestock ponds. Because we know that such developments and disturbances can affect indicators of land health, a separate analysis of developments is presented in the Determinations section. The studies and the development evaluations combine to present a more complete picture of where there are land health concerns, both at the landscape and local level.

The Causal Factor section is also formulated to point toward management solutions for lands with health concerns. Analysis of causal factors reveals a complex picture of interacting agents that are associated with land health problems. These are based on information collected at the upland and riparian study sites, and includes noxious weeds, historic grazing, sheep allotments, water diversions, altered river flows, irrigation return flow and wildlife use, along with many other, lesser factors. The development analysis is used in this section as well for additional insight into how developments, authorizations and casual uses of BLM land could be contributing to land health problems. Among all the different types of developments assessed in the Gunnison Gorge unit, BLM routes are the most widespread and influential to land health indicators.

Remedies that have been identified to address the land health problems vary from specific to general. They include actions ranging from development of improved grazing permit terms (BMPs), to specific projects like establishing barriers to prevent vehicle damage to sensitive plants near Carnation Road. While the list of remedies is long, many can be accommodated by minor shifts of the existing workload, or modification of activities that are already planned or underway.



The rugged and scenic Gunnison Gorge Wilderness as seen from the Ute Trail.

<u>Topic</u>	<u>Page Number</u>
Background.....	1
Adaptive Management.....	6
Methods.....	9
Determinations	11
Causal Factors.....	36
Remedies	51
 Appendix A: Data Summary Tables	
 Appendix B: Upland Transect Summary Sheets	
 Appendix C: Riparian and Water Quality Summary Sheets	
 Appendix D: Development Summary Sheets	
 Appendix E: Existing Environment	



Extensive areas of salt desert shrub and sagebrush habitat encircle the inner Gunnison Gorge. These habitats support a rich array of species, including the threatened Colorado hookless cactus and Gunnison sage grouse.

Background

Purpose and Need

In 1997, the Resource Management Plans (RMPs) guiding management in the Uncompahgre Field Office (UFO) of the Bureau of Land Management (BLM) were amended with the Standards for Public Land Health and Guidelines for Livestock Grazing. This amendment established five standards which describe conditions needed to sustain land health. The standards are described in terms of indicators which can be observed on the ground. The amendment states that while it is not always necessary to collect data to evaluate standards, it is important to have measurable baseline data so that changes can be observed and measured over time. In addition, the BLM's authorized officer is to determine the amount and type of data each situation requires in consultation, coordination and cooperation with local cooperators and the interested public. Finally, it states that in areas where the standards are not being achieved, current uses and management actions will be reviewed and modified if necessary to assure significant progress toward achieving a healthy ecosystem. The amendment then lays out guidelines for livestock grazing that will be consistent with land health.

For several years following the RMP amendments, there was little BLM guidance on how land health should be assessed. The 4180 Handbook for Rangeland Health Standards was published in 2001. It described a general process of sampling, extrapolation, and determinations but it did not describe specific methodologies for collecting land health data. For the initial round of health assessments, the UFO used a landscape-based approach which required visiting many sites in each grazing allotment or other type of management area, collecting information based on ocular estimates in unmarked plots, and filling out quick health checklists. This was not a highly repeatable approach, particularly since no fixed plots were used, and because of the diversity of soils and vegetation in the UFO. During the Land Health Assessments (LHAs), local cooperators and the interested public were invited to take part. Very little interest was shown, and it became clear that while there was interest in the results, there was not evident concern with how the data was collected.

Based on this history, recent guidance from the Colorado State Office, and the need to improve work efficiency, UFO staff determined that a new approach to LHAs would be beneficial. The new approach still utilizes landscape units, but uses and augments existing biological monitoring studies. This provides for evaluation of land health trend, improves repeatability, and enables us to focus more effort on areas which have land health problems. In addition, the new process includes monitoring the health impacts of developments, authorized and casual uses that occur on BLM. This provides information on the degree to which they collectively impact the health of the landscape unit, as well as insight on general land health concerns associated with each type of authorization or development. The original schedule for the Land Health Assessments will still be followed (Table 1). However, the Land Health Assessment will be treated as a ten year evaluation of monitoring data, with the expectation that problem areas will receive more frequent monitoring.

Table 1. List of Landscape Units and schedule for Land Health Assessments.

Land Health Assessment Unit	Last Assessment Period	Next Assessment Period
Gunnison Gorge	2000-2001	2011-2012
North Delta	2001-2002	2012-2013
Mesa Creek	2003-2004	2013-2014
Roubideau	2004-2005	2014-2015
Norwood	2005-2006	2015-2016
North Fork	2006-2007	2016-2017
Colona	2007-2008	2017-2018
West Paradox	2008-2009	2018-2019
Escalante	2009-2010	2019-2020
East Paradox	2010-2011	2020-2021

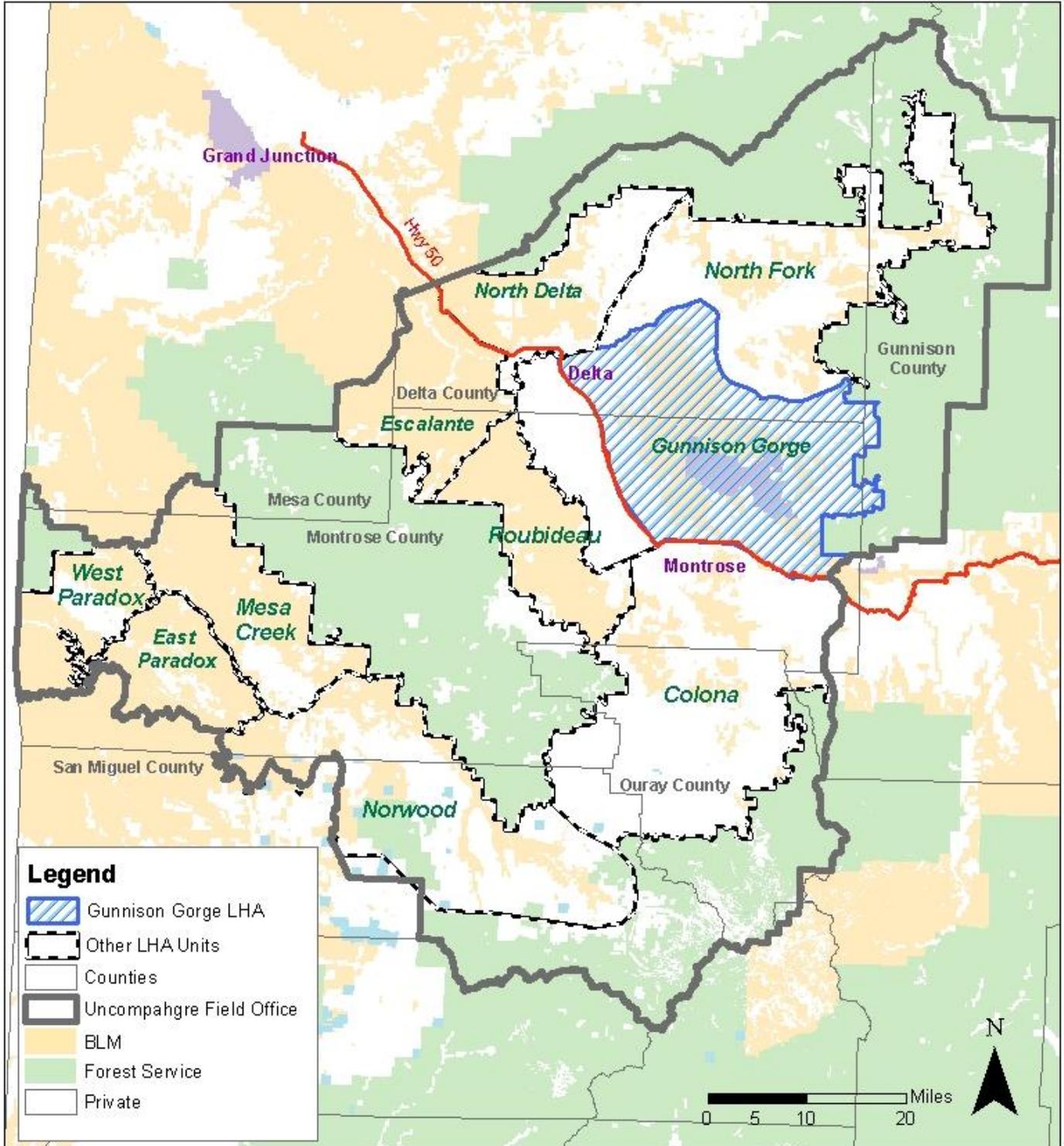


Figure 1. Gunnison Gorge Landscape Unit location map.

Overview of Gunnison Gorge Landscape Unit

Location

The Gunnison Gorge Landscape Unit is located in western Colorado, in the eastern part of Montrose County (Figure 1.) The unit also lies within the eastern part of the Uncompahgre Field Office (UFO) of the Bureau of Land Management (BLM), and its boundaries encompass over 300,000 acres. The unit is bounded by State Highway 50 on the south and west, the Gunnison National Forest on the east, and Redlands Mesa to the north.

Land Status and Designations

BLM public land totals 110,606 acres, and makes up less than half of the Gunnison Gorge landscape unit (Figure 2.) The Black Canyon National Park occupies over 27,000 acres, while private land makes up the rest. There are several types of specially designated BLM lands in the unit (see Table 2.) These include approximately 7,600 acres that fall under management of Curecanti National Recreational Area (NRA), and the Gunnison Gorge National Conservation Area (GGNCA) which covers over 63,000 acres. Within the GGNCA are the Gunnison Gorge Wilderness and two Areas of Critical Environmental Concern (ACECs.) Several Special Recreation Management Areas (SRMAs) are also located inside the NCA. The unit falls under the Gunnison Gorge National Conservation Area Resource Management Plan (2004). A substantial amount of land is under Bureau of Reclamation withdrawal for water use and development, however for the majority of those lands BLM has management responsibility. The Gunnison Gorge unit is divided into 41 grazing allotments which are useful regional subdivisions of the landscape, and are referred to in this document (see Figure 2).

Table 2. BLM land acreages in Gunnison Gorge LHA unit by designation type

Designation	BLM acreage in GGNCA	BLM acreage outside GGNCA
BLM lands managed by Curecanti NRA.	-	7,605
Gunnison Gorge National Conservation Area	63,202	-
Gunnison Gorge Wilderness and SRMA	17,780	-
Native Plant Community ACEC	3,785	-
Gunnison Sage Grouse ACEC	5,666	16,532
Fairview ACEC	-	161
Gunnison River SRMA	12,969	191
Flat Top-Peach Valley SRMA	8,142	1,731
BLM land without special designation	-	21,184
Total BLM land	63,202	47,404

Environmental Setting

The Gunnison Gorge landscape unit is an island of rugged, remote and geologically varied terrain surrounded by developed valleys made up of agricultural and residential lands. The unit includes the Gunnison Uplift and surrounding adobe hills. The Uplift is bisected from north to south by the Gunnison Gorge. The area straddles the Colorado Plateaus and Southern Rocky Mountain Ecoregions (U. S. Environmental Protection Agency, 2005). Several ecoregion subunits occur within the area: shale deserts and sedimentary basins to the west, semiarid benchlands and canyonlands in the middle, and sedimentary mid-elevation forests on the east. The Upper Gunnison, North Fork and Lower Gunnison Rivers help

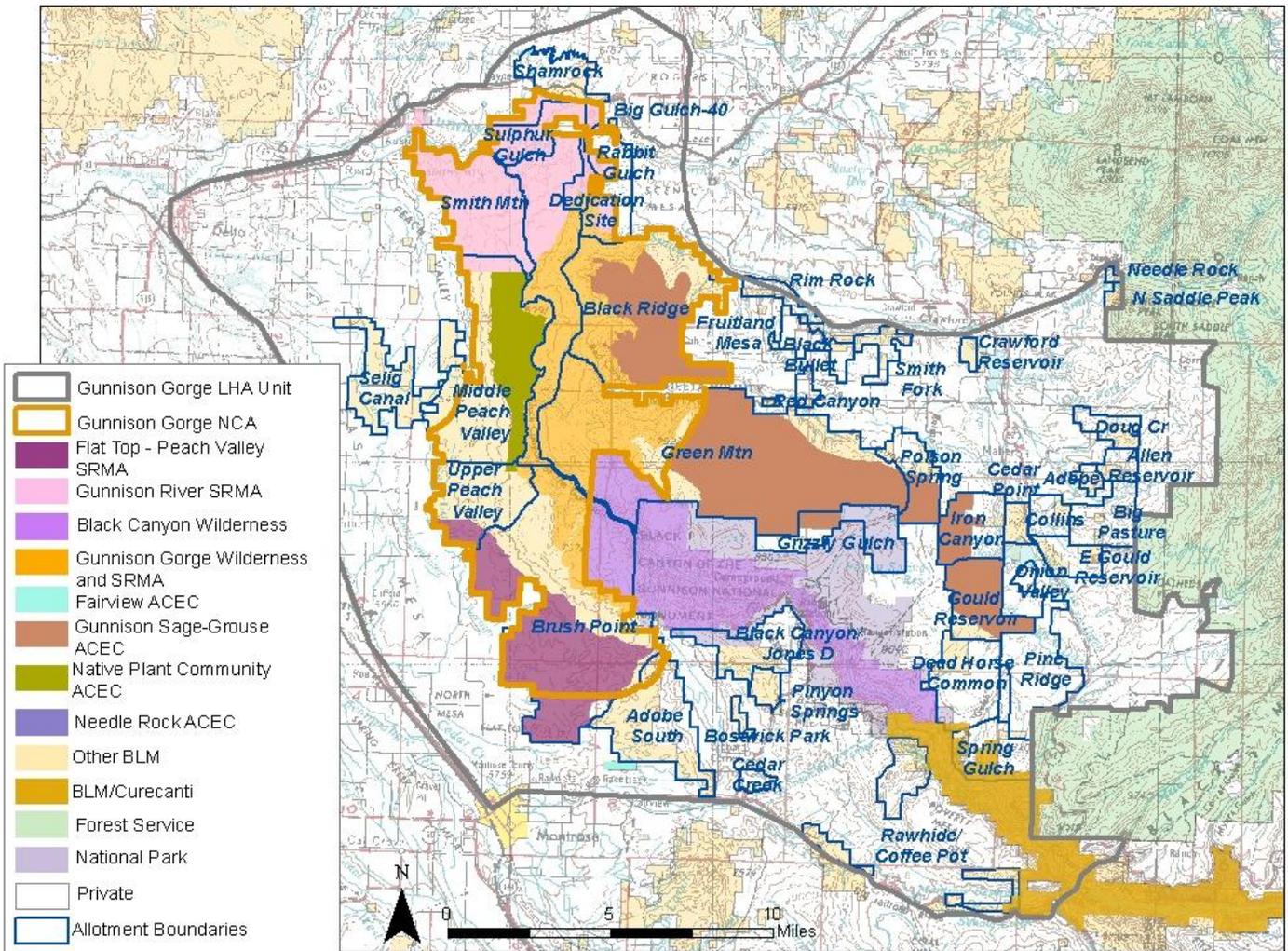


Figure 2. Land Ownership and Management Designations in the Gunnison Gorge Landscape Unit.

to define the unit with the deep canyons they have cut. Rounded adobe hills border the Gunnison Uplift to the west, south and north, while mesas and the foothills of the West Elk Mountains occur to the east.

The Gunnison Gorge landscape unit is primarily semi-arid, although precipitation is variable. Annual precipitation in the nearby town of Montrose has averaged 9 inches (ranging between 5 and 15 inches) over the last 50 years, while precipitation in Cimarron has averaged 13 inches over that time. Precipitation is fairly evenly distributed across the months of the year and between cold and warm seasons. Temperatures in Montrose typically range from 14°F lows in January to 88°F highs in July. Cimarron, which is located above 7,200', is cooler with January lows of 0°F and July highs of 85°F. The unit is subject to frontal, convectional, and monsoonal storm patterns. Soil moisture in spring is generally consistent and abundant, drying out in late May and June, and then subject to localized short-term recharge from thunderstorm activity in late July through September. The storms bring with them lightning activity which generates fire starts in dry years.

The past decade started off with a severe drought. The climate since 2003 has been slightly warmer than normal, with an average winter month increase of nearly 1.2°F as compared to weather patterns over the last several decades, and an average summer month increase of 0.7°F. Precipitation over that same timeframe has averaged nearly 100% of normal, with slightly higher than average precipitation in the winter months for the areas near to Montrose and Cimarron paired with slightly lower summer precipitation. Meanwhile, areas near to Delta have experienced slightly higher than average summertime precipita-

tion, while winter precipitation has been lower than average. There have been no outstanding dry years across the three weather station areas since the drought of the early 2000s. Region-wide data indicates that 2000-2004 and 2009 were drier than average on the Western Slope, while 2005, 2006, and the beginning of 2011 were wetter than average.

The Legacy of Historic Land Uses and a Changing BLM

The history of land use and management in and around the Gunnison Gorge unit has led to many of the conditions we now see on the ground. Historically inhabited by the Ute Tribe which subsisted on hunting and gathering, the area was next settled in the late 1800s by European descendants. These settlers brought cattle and sheep into the area, and were soon grazing thousands of head in and around the Uncompahgre and North Fork Valleys, with heaviest use typically occurring nearest to the valley floors. Historic accounts describe extensive impacts from livestock grazing during this period. While livestock numbers have been greatly reduced since that time, cattle and sheep continue to be a primary focus of agriculture in the area. Livestock still graze on public land, where many range improvements have been constructed over the past half century. These include small reservoirs to provide water, fences, stock trails, corrals, spring developments, cattleguards, and vegetation treatments to increase livestock forage. Similar developments and vegetation treatments have been carried out to a lesser extent to improve habitat conditions for big game species. In addition to grazing, hunting has been a long term, primary use of the unit, particularly on the east side.

Settlement of the area included establishment of small farms that relied on river water for irrigation. Waters from the Gunnison River were diverted through the Gunnison Tunnel in the early 1900s, which greatly increased agricultural and residential development in the neighboring Uncompahgre Valley. The growing use of water included establishment of water rights and diversions which reduced or otherwise altered flows in most rivers and streams in the area. In the 1960s, the series of dams on the Upper Gunnison River known as the Aspinall Unit was developed for power production as well as to improve water management for downstream users. Large areas of Mancos shale on the eastern side of the unit were contour furrowed and gullies were plugged during the 1960s to reduce sedimentation into downstream reservoirs.

As populations grew and small towns developed throughout the agricultural areas, the outlying lands in the Gunnison Gorge unit received increasing levels of use. Many of these areas which include the “adobes” were often treated as wasteland by the public. Activities ranged from dumping to target shooting, partying and off-road driving for motorcycles as well as full size vehicles. Population growth brought increased impacts associated with heavy traffic, road maintenance and improvement, and utility ROW development along Highways 50 and 92.

BLM vegetation management has been increasingly influenced over the past two decades by the need to control fuels next to the expanding wildland-urban interface, by efforts to improve deer and elk habitat in part to reduce big game damage to private land, and by the growing concern about Gunnison sage grouse and the need to improve its habitat. This has occurred primarily on the eastern side of the unit. While the outer lands in the unit experienced increasing levels of use, the inner part of the unit along the Gunnison River was attracting growing numbers of recreationists drawn to the high quality fishing and whitewater boating opportunities.

All of these activities have left their mark on wildlife, soils, water quality and vegetation on public lands in the Gunnison Gorge unit. Many of these activities predated the BLM, and others have taken place early in the BLM’s development as a land management agency. While the BLM has long had a mission of reducing livestock grazing conflicts, other aspects of the agency’s mission have evolved over the years. Management has broadened to include recreation, wildlife habitat, lands and realty actions, among others. Additionally, BLM’s direction and priorities have changed as the science of land management has advanced and Congress and the Administrative branch of government have added new laws and regulations. Colorado’s Standards for Public Land Health reflect just one of the many refinements in direction that BLM has undergone. The designation of the GGNCA is a further example of BLM’s broadened management mandate.

Designation of the GGNCA and its accompanying Management Plan (BLM 2004) have shifted management direction across much of the landscape unit. Large emphasis areas for Gunnison sage

grouse conservation, river-based recreation, OHV use, and designated wilderness have promoted recreation and conservation of natural values to a higher priority, while traditional uses receive less emphasis in this landscape unit. However, designation has also triggered increased levels of public visitation and development beyond that which occurs on neighboring BLM lands.

This history has implications for land health and the BLM's ability to bring about changes. Many of the land health problems in the Gunnison Gorge unit are due to the legacy of heavy use and degradation caused many years ago. Other health problems are associated with exotic weeds which once established are extremely difficult to control. Some problems are associated with uses over which BLM has little or no control, such as the water rights system overseen by the State of Colorado. In other cases BLM has limited ability to change long-held public perceptions and habits, as is the case with off-road driving in the adobes. These factors provide a context for understanding conditions in the Gunnison Gorge unit, and will in turn will shape the actions the BLM chooses to pursue to improve land health.

Adaptive Management Review

Previous Land Health Assessment: Determinations

The last Gunnison Gorge Land Health Assessment (LHA) took place in 2000-2001, with the following results:

Table 3. 2001 Gunnison Gorge LHA Determinations. Figures are shown in blue to avoid confusion with current LHA results.

2001 LHA: Overall Acreage Determinations for Standards 1, 3, and 4				
Meeting	Meeting with Problems	Not Meeting	Unknown	
35,291 (32%)	60,812 (55%)	5,030 (5%)	8,098 (7%)	
Overall Stream Mile Determinations for Standards 2 and 5				
Meeting	Meeting with Problems	Not Meeting	Unknown	
50.5 (60%)	29.9 (35%)	4.5 (5%)	0.3 (<1%)	
2001 LHA: Determinations for Individual Land Health Standards				
Standard	Meeting	Meeting with Problems	Not Meeting	Unknown
Standard 1-Soils (acres)	77,861 (71%)	23,181 (21%)	48 (<1%)	8,098 (7%)
Standard 2-Riparian (miles)	14.8 (37%)	24.7 (62%)	0 (0%)	0.3 (1%)
Standard 3-Healthy Communities (acres)	47,348 (43%)	48,734 (45%)	5,008 (5%)	8,098 (7%)
Standard 4-T&E Species (acres)	84,692 (78%)	26,433 (24%)	0 (0%)	0 (0%)
Standard 5-Water Quality (miles)	74.7 (89%)	5.0 (6%)	4.4 (5%)	0 (0%)

The most notable land health problems observed included :

- **Standard 1:** While soil problems were limited, they were mainly related to heightened erosion risk rather than accelerated erosion, except in isolated areas which had active gullies. Erosion risk factors including high bare ground and low plant basal cover were found in many locations.
- **Standard 2:** Most riparian areas had some minor problems relating to altered vegetation communities and channel morphology changes associated with regulated flows. These were mainly along the Gunnison River.
- **Standard 3:** Most areas had only limited problems. Where problems were serious, they ranged from lack of perennial grasses and forbs, nonnative annuals dominating the plant community, scattered noxious weed infestations, low shrub vigor in some areas, and issues with age class diversity.
- **Standard 4:** Low forb cover, poor shrub vigor and old age class vegetation in some areas of Gunnison sage grouse habitat, and high levels of soil disturbance in Mancos shale rare plant habitat.
- **Standard 5:** Problems were limited to watershed conditions and an eroding channel in the Peach Valley drainage and high temperatures, dissolved solids, and lack of aquatic life in the Smith Fork.

Previous Land Health Assessment: Recommendations and Follow-up Management

Management in the unit has not been specifically driven by the LHA results. However, many actions that have taken place in the LHA unit over the past ten years have been consistent with the recommendations. A summary of the recommendations from the previous LHA is listed below. Blue type indicates where follow-up actions have taken place.

- 1) Map gully systems, identify and correct causes where possible.

Contour furrows and over 1,000 check dams have been mapped throughout most of the Peach Valley area to inventory gully and erosion problems associated with these old treatments.

- 2) Where heightened erosion risk, perennial grass and forb cover, invasive exotic species or cool season grass cover is a problem, manage grazing to reduce dormant season utilization, shorten duration of grazing during plant growth periods, reduce utilization on native riparian plants to sustain their abundance and vigor, and reduce the number of years that spring and fall grazing occur in the same pasture.

Grazing permits were modified with terms and conditions that specify utilization levels, season of use, duration of grazing during the growing season, and riparian woody species utilization. In some cases, grazing has exceeded the utilization limits set in the permit terms.

- 3) Evaluate road inventory data to identify sources of erosion and take corrective action through road maintenance, or OHV and road management.

Many of the routes in the NCA have been mapped using GPS, and data on erosion status has been collected on some of these. While travel outside of the two open areas has been limited to routes originally designated in the RMP, route designation has not been completed using an interdisciplinary process that considers resource impacts.

- 4) Establish test plots for restoring native communities in degraded swales in the Mancos soils of the western part of the NCA area, expand successful approaches to conservation demonstration areas and larger areas, then manage restored areas to sustain native plant communities.

Grazing exclosures were constructed, and two small scale test seedings were carried out in the Candy Lane area, with little success. There has not been follow up work on these seedings.

- 5) Increase herbaceous dominated early and early-mid seral patches to percentages outlined in the UFO Fire Management Plan by using a combination of fire, mechanical, and chemical treatments, followed by seeding of native species. Ensure follow-up management maintains seral stage or natural disturbance needed for long-term maintenance.

Numerous vegetation treatments have been conducted in the Black Ridge and Sage Grouse areas, totaling 5,747 acres (with some overlap). These were done primarily to improve sage grouse and elk habitat. Seeding has typically occurred in these treatments. Grazing permits include terms to rest treatments for two growing seasons.

6) Work with Black Canyon National Park to secure occasional “flushing flows” for the Upper Gunnison River below Crystal Dam to reduce sedimentation in the channel and establishment of nonnative vegetation.

The Park Service Black Canyon water right is final and includes peak spring flows, shoulder flows and low flows to simulate the natural hydrograph.

7) Control noxious weeds by: completing weed inventory for NCA area, developing and implementing a strategy to control and reduce the amount of noxious weeds in the NCA, and seeding disturbances on the landscape with native species that can compete against exotic species.

A weed inventory has been completed for the Gunnison Gorge unit. Approximately 1,197 acres of weed infestations have been mapped over the past decade. Weed treatment records have not been fully compiled in GIS, but indicate that annual weed treatment averages 293 acres in the unit. The strategy is to treat high priority species using an early detection-rapid response approach. Some of the more common species are also being treated in some areas, for example Russian knapweed in some of the stock ponds. Tamarisk has been virtually eradicated from the Inner Gorge area, and reduced by more than half along the Lower Gunnison.

8) Expand water quality monitoring to: identify levels of Fecal coliform bacteria in the Smith Fork, Gunnison River, and the North Fork; characterize chemical properties of the water in both the Smith Fork and Iron Creek; more comprehensively evaluate watershed conditions on Mancos shale areas; and establish a baseline inventory of macroinvertebrate taxa on perennial water systems within the landscape unit.

Water quality data was collected for the reaches listed above. Macroinvertebrate sampling has been carried out on the rivers and larger streams in the unit. Efforts at watershed characterization of the mancos shale areas was attempted with the USGS and their mancos shale research. That data has not been fully applied to the watershed characterization as originally planned.

9) BLM should remain involved with the ongoing, state driven, Selenium - Total Maximum Daily Load process that is ongoing in the Lower Gunnison Basin. Future management efforts to reduce Selenium yields could include implementation of management activities that minimize both surface runoff and soil erosion on public land within the landscape unit on soils derived from Mancos shale.

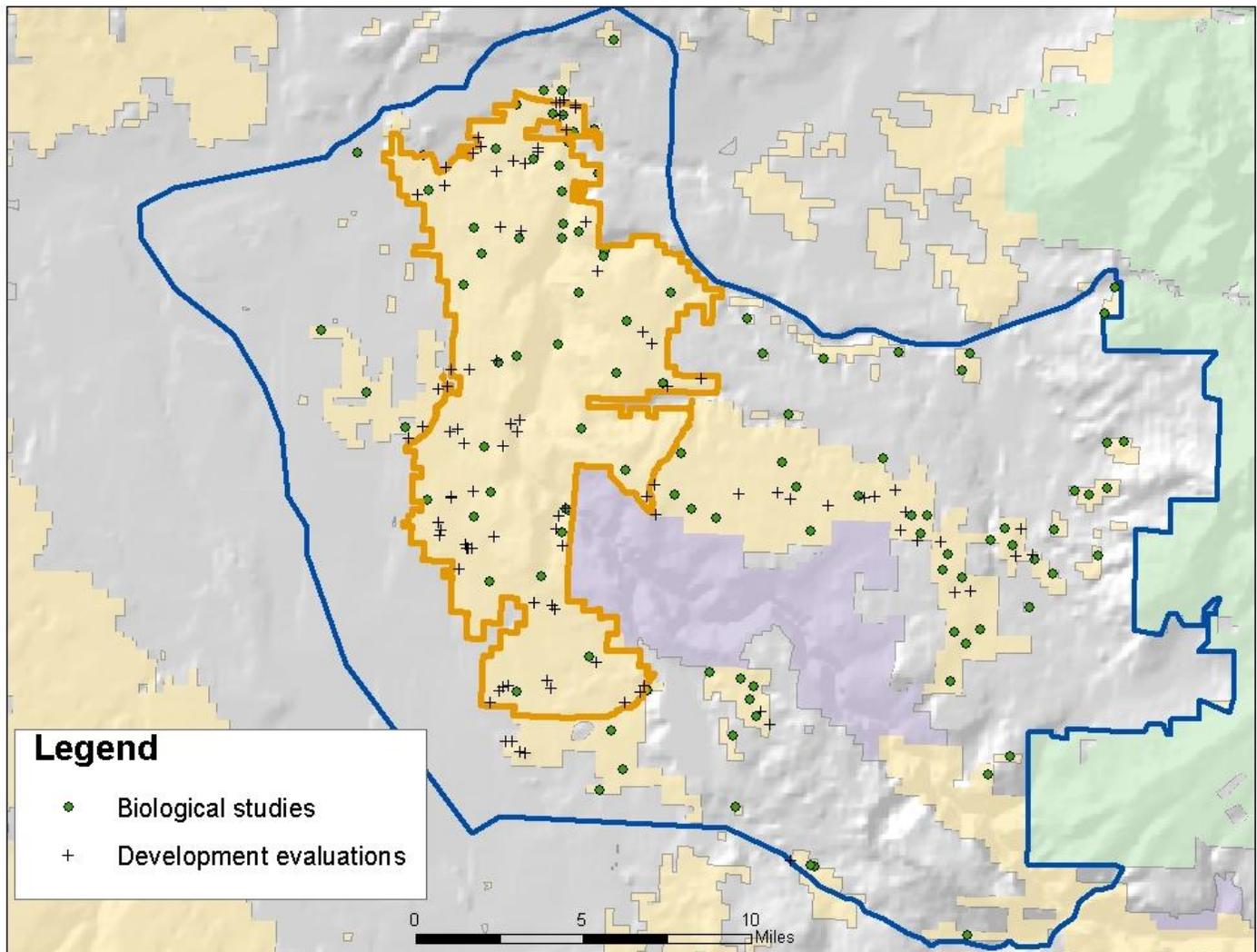
BLM has maintained involvement with this process through the Selenium Task Force. All land exchanges and surface disturbing activities are reviewed to reduce impact and potential mobilization of selenium to aquatic systems.

Land Health Assessment Methodology

1. Existing permanent monitoring studies for uplands and riparian areas were selected to represent each of the following categories: allotments, important vegetation types, vegetation treatments, special management areas, and former land health status. These were used as the basis for the biological upland and riparian/water studies.
2. New biological study locations were identified to ensure all important categories were represented. These supplemented the existing biological studies. Between existing and new studies, a total of 94 upland studies and 17 riparian studies were identified (see Figure 3.) Steep areas of rock outcrop, talus or adobe slopes were not represented by studies. They are considered to meet standards.
3. Ninety nine development evaluation sites were selected to represent site-specific authorizations, BLM constructed projects, user or permittee created developments, or other types of localized disturbances (see Figure 3).
4. Biological upland studies were read from May through October of 2011 by a wide range of biological specialists. Both upland and riparian/water-based studies were included. Upland field work involved collecting soil surface groundcover data using 90 point-intercepts arrayed along a 100' transect. Plant canopy cover data was collected by plant species using 15 20 x 50cm frames for herbaceous vegetation and 15 2.5 x 6' frames for woody species cover along the same 100' transect. Daubenmire cover classifications were used to estimate canopy cover in order to reduce reader error. Plant species frequency (presence/absence) was also read in the larger plot frames to capture information on less common species. Browse shrub condition was evaluated by using a nearest individual sampling procedure for 25 shrubs along a paced transect. Shrub species, age class, hedge class and vigor were documented for each shrub. Tree stands were also characterized using a nearest neighbor approach to sample 25 trees for age class, species, diameter at stump height, vigor, and average distance between trees. Land health characterization forms were filled out at each study site for environmental, soil erosion, and vegetation characteristics. Each site was also evaluated for evidence of any type of human-related or notable natural influence, and photos were taken at each study site. Wildlife evidence forms were filled out at each study site. Additional measurements were included specifically to assess sagebrush vegetation relative to Appendix H (GUSG Structural Habitat Guidelines) in the Gunnison Sage-grouse Rangewide Conservation Plan (2005).
5. Biological riparian and water-based studies were read in September of 2011, and followed a modified Greenline methodology with a cross section transect and transects that were parallel to the channel. Line intercept data was collected for each plant association encountered along each transect. Lotic Proper Functioning Condition forms were also filled out for each site. Riparian studies included evaluation of the site for evidence of any type of visible human-related or natural influence. Photos were taken at each study site. Wildlife evidence forms were filled out as well. Water chemistry samples and macroinvertebrate samples were collected at some sites and sent to labs for processing. Data from previous years' water chemistry and macroinvertebrate sampling was also utilized, along with road density data.
6. Breeding bird surveys were conducted in the area (Dunne 2011, Inventory of Breeding Birds in the Gunnison Gorge National Conservation Area, unpublished report).
7. Developments were evaluated in September and October of 2011 by small interdisciplinary teams that had representatives from Biological, Recreation and Lands and Minerals staff. Standardized development forms that required examination of development condition, compliance, and effects on land health indicators (outside the immediate footprint of the development) were filled out.
8. Data was entered into MSAccess databases for developments, riparian, vegetation study, and wildlife observations, and into ARCGIS. Digital photos were organized and linked to the data points in GIS. Data from the biological transects was summarized by individual study and reported on the biological study summary sheets (See Appendix B and C) and data from the development forms was summarized by development type on individual summary sheets (see Appendix D.)
9. The interdisciplinary biological team met to make land health determinations for each study site. Determinations were based on comparing the data for a site versus what would be expected for that same ecological site (from averages developed with data from the 1999-2009 LHAs). Indicators showing notable problems (>20% departures from the average values in a negative direction), or

notable positives (>20% positive departures from average values) were also identified. Expert knowledge and discussions tempered these decisions. Where there was preexisting study data, trends were also determined by the interdisciplinary bio-team (see Determinations section.) Trends were considered positive if there was a >20% change in a positive direction for an indicator, or negative if there was a >20% change in a negative direction.

11. The full interdisciplinary team met to evaluate the development results. The group categorized each development type based on its impacts to land health indicators, and abundance and distribution in the Gunnison Gorge Landscape Unit. Potential remedies to land health problems were also discussed. Results of these discussions and rankings are included in Development Analysis sections throughout the document, as well as the Remedies section.
12. Determination data from each biological study site was extrapolated to similar areas within an allotment and vegetation type using GIS. Acreages for Land Health Determinations were calculated and maps showing Land Health determinations were generated.
13. Land health indicator problems, cases where there were particularly good conditions, and trend data were analyzed to identify patterns and locations of specific types of problems on the landscape (see Determinations Section and Appendix A.)
14. Causal factors were identified by comparing the evidence of human-related or notable natural influences between sites that were meeting health standards versus those which were determined to have land health problems. Developments were analyzed to determine where there was overlap between areas with Land Health problems and development types found to have concerns with related indicators. (see Appendix A.)



LAND HEALTH DETERMINATIONS— OVERVIEW

Definitions: Land Health Determinations are formal ratings of public land health. Lands are rated as meeting or not meeting each of the 5 Land Health Standards based on an evaluation of specific indicators for each standard. Lands that meet standards are further subdivided into lands meeting and lands meeting with problems. Standard 1 covers soil health, Standard 2 deals with riparian health, Standard 3 relates to healthy plant and animal communities, Standard 4 involves special status species and habitats, and Standard 5 deals with water quality. If an area fails to meet one or more of the 5 Standards, it is categorized as not meeting Health Standards. Developments include site specific authorizations, user created sites, and constructed features which have the potential to impact land health indicators.

Summary of Land Health Determinations for the Gunnison Gorge Landscape Unit

Acreage figures are shown for each Land Health category for each standard. Percentage figures for Standard 2 and Standard 5 show the land health determinations as a proportion of the total riparian and stream channel area.

	Lands and Streams Meeting (acres / % of unit)	Lands and Streams Meeting with Problems (acres / % of unit)	Lands and Streams Not Meeting (acres / % of unit)	Not Evaluated/ Not Applicable (acres / % of unit)
All Standards	44,889 / 44%	38,256 / 37%	14,506 / 14%	5,275 / 5%
Standard 1	84,330 / 82%	11,834 / 11%	382 / 0.4%	6,379 / 7%
Standard 2	582 / 38%	539 / 34%	0 / 0%	445 / 28%
Standard 3	55,755 / 53%	29,565 / 29%	11,226 / 11%	6,379 / 7%
Standard 4	51,234 / 50%	33,627 / 33%	12,805 / 12%	5,258 / 5%
Standard 5	1,052 / 64%	0 / 0%	52 / 3%	573 / 33%

Land Health Determinations

Explanation of Approach: Land Health Determinations identify whether or not BLM lands function at the basic ecological levels specified in the Land Health Standards. Determinations were originally made in 2001, and are refined in the 2012 assessment. Trend information is also added for each standard.

Information on the nature and location of land health concerns is produced, both for the site and landscape level. Determinations are based on data from biological studies which are located at representative “undeveloped” sites across the landscape unit and extrapolated to larger areas. Determinations are therefore general in nature and give a picture of what is likely in a given area, management unit, or other subdivision of the landscape, although conditions at a particular site may vary (see Appendix A for detailed analysis.)

The Development Analysis sections provide a look at developments in relation to each health standard. While developments did not influence the determinations, the goal is to understand likely impacts from a given type of development on nearby land health indicators. The Development Analysis is based on a sample of the different types of developments or authorizations found in the Gunnison Gorge unit and is compiled for each type of development (see box at right and Appendix A and D for details.)

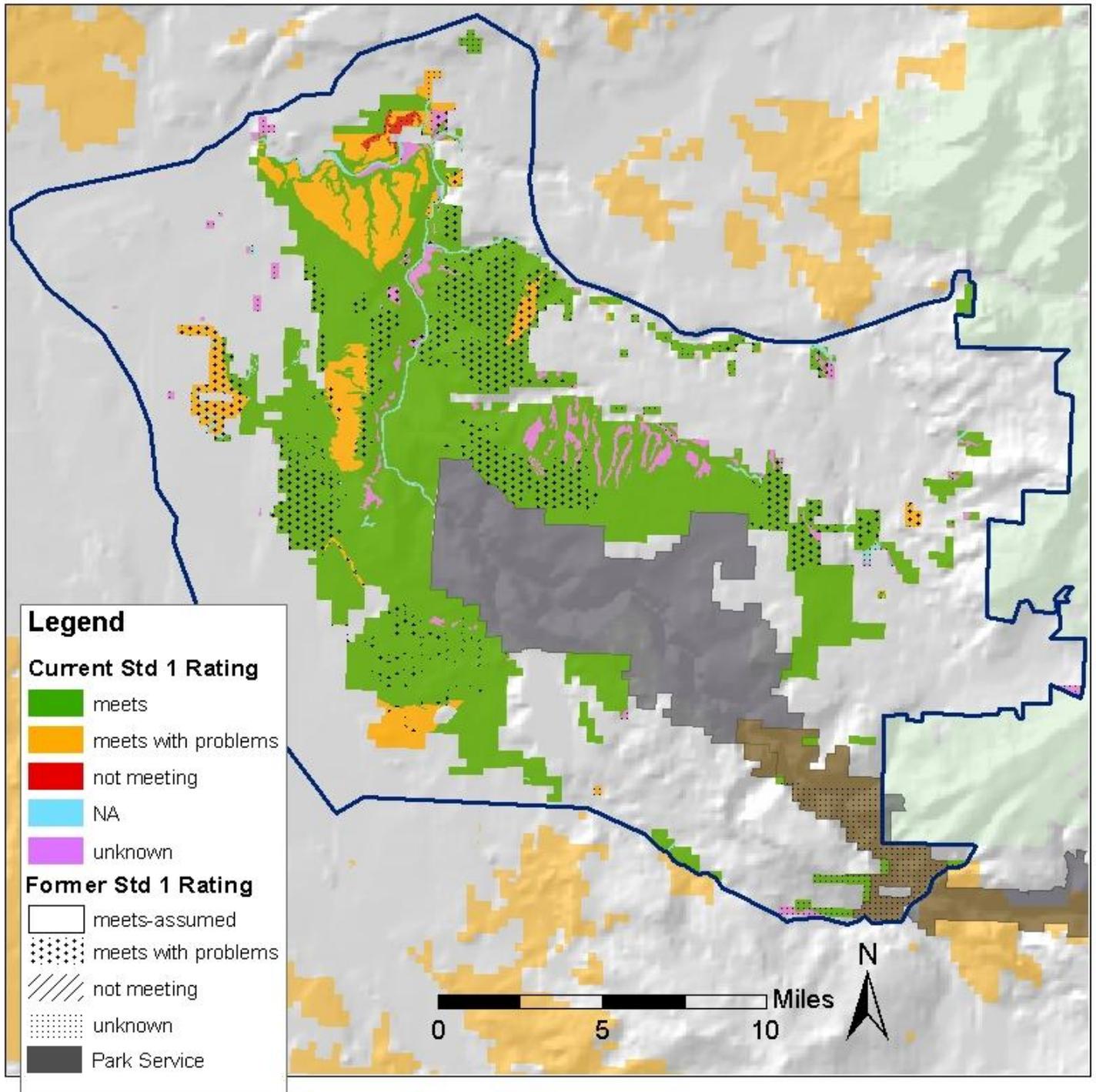
Development Types Assessed

(documented abundance and degree of influence in the Gunnison Gorge Unit is shown in parentheses, see Appendix A and D for details)

- **Abandoned Mines (6-low)**
- **BLM Routes (567 miles- high)**
- **Campsite (43-moderate)**
- **Cattleguards and Corrals (7-low)**
- **Communications Site (4-low)**
- **Contour Furrows/ Check Dams (<20% of unit –moderate)**
- **Cultural Interpretation Sites (1-low)**
- **Developed Recreation Sites (34-high number but moderate influence in unit)**
- **Ditch ROWs (3-low)**
- **Exclosures (5-low)**
- **Fences (unknown #-moderate)**
- **Gas Pipeline ROW (9-low)**
- **Gas Wells/Pads (8-low)**
- **Mineral Developments (2-low)**
- **Power/Telephone ROWs (16-low)**
- **Reservoirs/stock ponds (63-moderate)**
- **Road and Highway ROWs (>100 miles-moderate)**
- **Spring Developments, Guzzlers and Drinkers (13-low)**

LAND HEALTH DETERMINATIONS FOR STANDARD 1 SOILS

Figure 4. Standard 1 Land Health Determinations map.



Land Health Determinations

	Standard 1 Determinations (acres / % of unit)				
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Upland
Current Rating	84,330 / 82%	11,834 / 11%	382 / 0.4%	4,702 / 5%	1,677 / 2%
Former Rating	77,838 / 71%	23,180 / 21%	48 / <0.1%	8,034 / 7%	682 / 1%

STANDARD 1 DETERMINATIONS: INTERPRETATION

Definition: To meet Standard 1, upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

Comparison of Current and Former Determinations

Standard 1 Determinations have improved since the preceding Land Health Assessment of 2000-2001 (see Figure 4.) Most importantly, lands rated as meeting Standard 1 have increased, and lands meeting Standard 1 with problems have decreased. Many of the lands determined to be meeting with problems in the last LHA were vulnerable to increased soil erosion because of high levels of bare, unprotected soil, and low plant basal cover. In 2010, the only widespread soil indicator of concern on these lands was low biological soil crust (BSC) cover. Trend studies on these areas indicate that for the most part bare soil is declining, while plant basal area and litter cover are both increasing. Overall trends are shown in Figure 5.

Large Scale Patterns

To improve our picture of soil issues, the land health studies have been grouped into various subdivisions (shown in green type) which can be important at the landscape scale. Data is interpreted below in terms of general patterns (either positive or negative current conditions) observed within major vegetation types, treatment types, and lands with special management designations (see Appendix A.) Trends are also shown for these subdivisions.. Similar information on individual allotments is available in Appendix A. Where indicators are not mentioned, no overall pattern was observed.

A major component of soil health includes surface disturbance, both in terms of its amount and distribution. In this Land Health Assessment, surface disturbance is mainly handled through the development analysis and associated maps (see Appendix D).

Vegetation Types: **Aspen** vegetation, which is very scarce in the unit, meets Standard 1. **Grass-Forb** vegetation generally meets Standard 1 with problems, has low BSC cover and plant litter imbalances, but minimal pedestals. Bare soil is generally decreasing, and litter is increasing. Overall, **Mountain Shrub** vegetation meets Standard 1, and has increasing plant basal area, but bare soil is generally increasing as well. **Pinyon-Juniper** vegetation generally meets Standard 1 and has generally decreasing bare soil along with increasing plant basal area, but BSC cover is also decreasing. **Sagebrush** vegetation generally meets Standard 1 with low bare soil and high plant basal cover, and no general soil trends are apparent. The majority of **Salt Desert Shrub** vegetation sites meet Standard 1, but some problems are evident including generally low plant basal cover and litter concerns, with increasing plant litter levels over time as exotic annuals increase.

Vegetation Treatments: **Brushbeat** treatments meet Standard 1 despite having low BSC, probably because of high plant basal cover. Plant basal cover is typically increasing, and litter cover is declining. **Pinyon-Juniper removal** treatments meet Standard 1, and also have low BSC cover paired with high plant basal cover. While bare soil is decreasing, plant basal area is generally declining as well. The 1980s era **Plow and Seed** treatments meet Standard 1 and generally have high plant basal cover and good plant

Standard 1 Indicators:

Gullies: Alter site hydrology and remove soil

Flowpaths: Erode soil and deprive site of water needed for plant growth

Pedestals: Indicate loss of surface soil, loss of site productivity and potential

Bare Soil: Indicates site is vulnerable to the erosive forces of water and wind

Plant Basal Cover: Low levels Increase the risk of soil erosion, show that site is not producing vegetation at full potential

Biological Soil Crust (BSC): Stabilizes soil and adds soil nutrients

Plant Litter: Too much changes soil carbon dynamics and ecology, too little reduces soil protection and organic matter.

STANDARD 1 DETERMINATIONS: INTERPRETATION

litter levels, but low BSC. Plant basal area is generally increasing over time. **Prescribed Fire** treatments meet Standard 1 despite having generally low BSC, high bare soil, and low plant basal cover. Plant basal area is increasing overall, and plant litter levels are generally declining. **Rollerchop** treatments meet Standard 1 with no overall soil indicator patterns other than generally decreasing bare ground. **Wildfires** generally meet Standard 1 with good plant litter levels, but low BSC. Bare soil is generally increasing along with plant basal area, and plant litter levels are generally declining, probably as annuals decline on these 10-20 year old burns. **Untreated** vegetation generally meets Standard 1, but there are many problem areas as well. Studies show no overall soil indicator patterns other than generally increasing plant litter levels.

Special Management Areas: **Fairview ACEC** meets Standard 1 although it has high bare soil, which is offset by minimal pedestals and high BSC cover. **Flat Top/Peach Valley SRMA** generally meets Standard 1 but has some problem areas as well. Overall, there are minimal pedestals, bare soil is decreasing, while plant basal cover and plant litter are increasing. The **Gunnison Gorge NCA** generally meets Standard 1, but there are a number of problem areas as well. Both plant basal and plant litter cover are increasing as a general rule. The **Gunnison Gorge Wilderness** meets Standard 1, although it generally has low plant basal cover, which is offset by low bare soil cover. The majority of studies in the **Gunnison River SRMA** meet Standard 1 with problems. These generally have low BSC, low plant basal cover, and plant litter concerns. Plant basal area is generally declining, and plant litter levels are increasing. The **Gunnison Sage Grouse ACEC** generally meets Standard 1 and shows no overall soil indicator patterns. The **Native Plant ACEC** is divided between meeting Standard 1 with problems and meeting Standard 1. Concerns include low BSC, low plant basal cover, and plant litter imbalances. Bare soil and BSC are generally declining, while plant basal cover and litter levels are generally increasing.

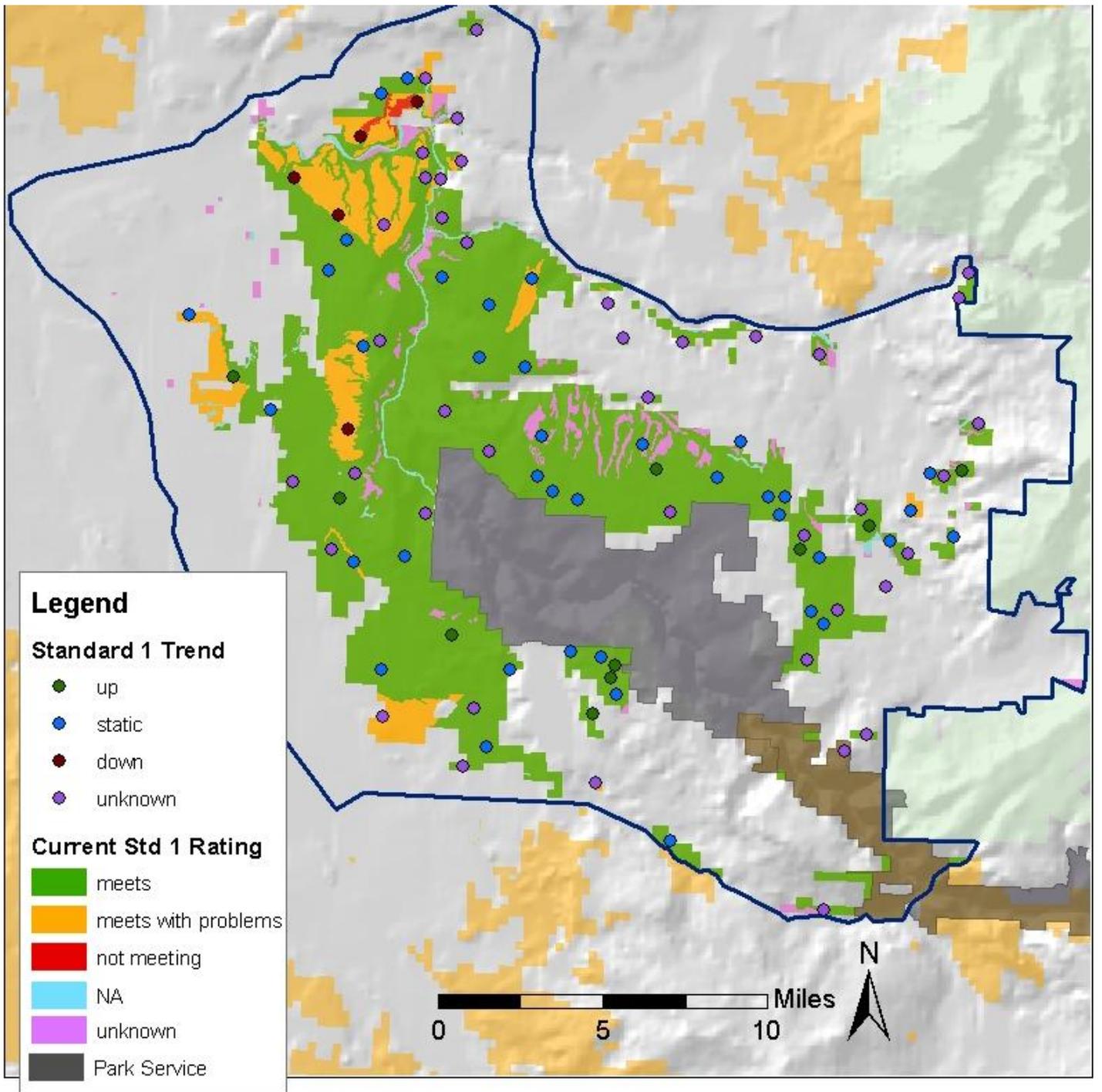
Development Analysis

The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. The following types of developments showed degradation to adjacent soil indicators at levels worth noting. Asterisked developments are moderately to widely distributed across the unit, and may be contributing to land health issues on the landscape:

- * **Water erosion**-was sometimes increased at abandoned mine sites, BLM routes*, contour furrows and check dams*, gas wells and pads, mineral development sites, and road and highway Rights of Way*.
- * **Wind erosion**-was only a concern with contour furrows and check dams*, and mineral developments.
- * **Groundcover**-was found to be an issue at some AML sites, BLM routes*, campsites*, Cattleguards and corrals, contour furrows and check dams*, developed recreation sites*, gas well pads, mineral developments, and road and highway Rights of Way*.

STANDARD 1 DETERMINATIONS: TRENDS

Figure 5. Standard 1 Land Health trends map.



Land Health Determinations

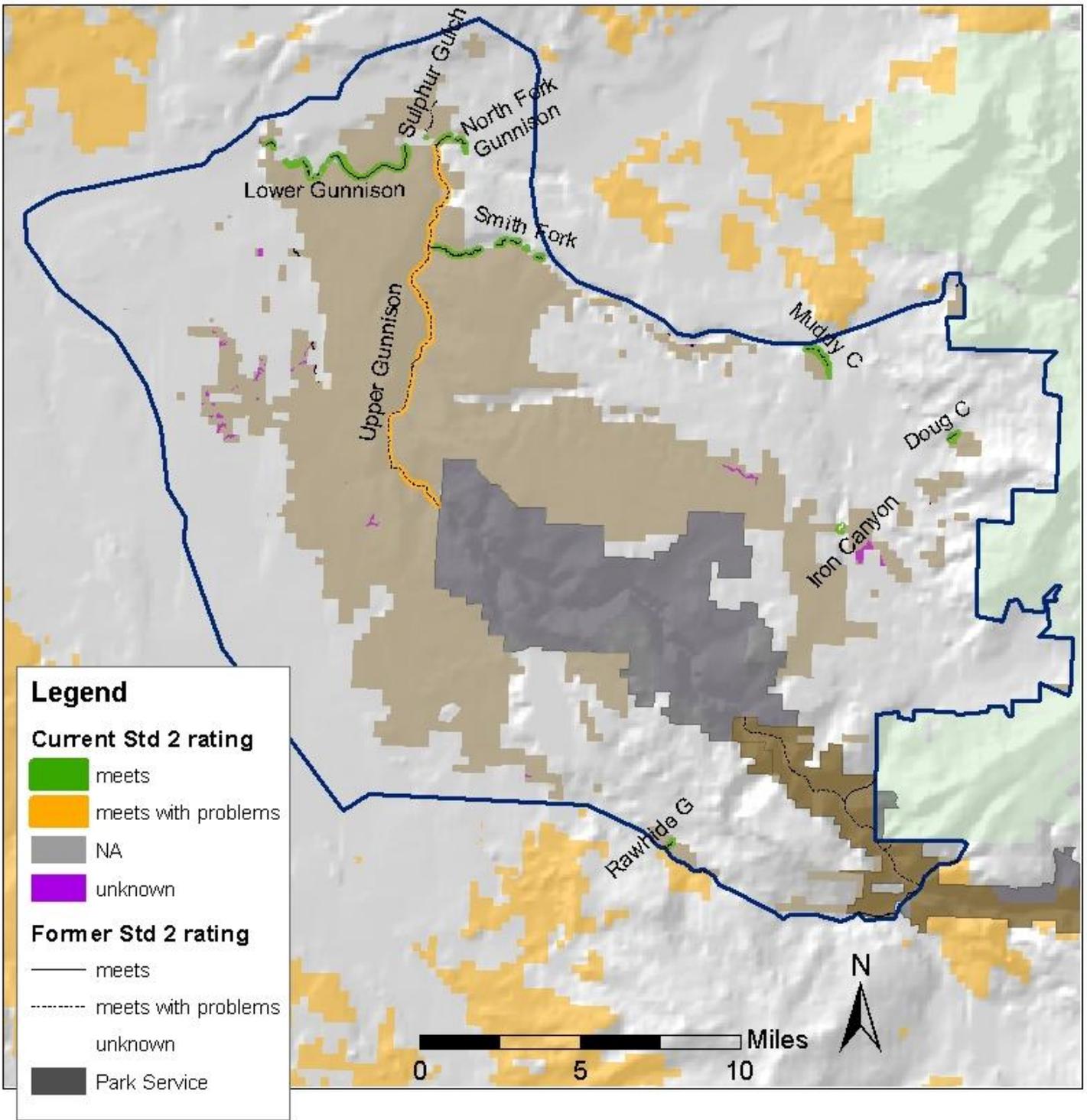
Trends for each Standard 1 Health Category (% of acres in category)

	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
Soil Trend Up	8%	0%	0%
Soil Trend Static	39%	31%	0%
Soil Trend Down	1%	35%	100%
Undetermined	52%	34%	0%

LAND HEALTH DETERMINATIONS FOR STANDARD 2 RIPARIAN

Figure 6. Standard 2 Land Health Determinations map.

Land Health Determinations



Standard 2 Determinations (acres or miles / % of riparian)

	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Riparian
Current Rating	582 ac./ 38%	539 ac. / 34%	0 ac. / 0%	445 ac. / 28%	101,360 ac./ NA
Former Rating	15 miles / 38%	25 miles / 62%	0 miles / 0%	0.3 miles / 1%	NA

STANDARD 2 DETERMINATIONS: INTERPRETATION

Definition: *To meet Standard 2, riparian systems function properly and have the ability to recover from major disturbances such as fire and 100 year floods. Riparian vegetation captures sediment, and provides forage, habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water slowly.*

Comparison of Current and Former Determinations

Standard 2 Determination amounts and percentages have changed little in comparison with the preceding Land Health Assessment of 2000-2001 (see Figure 6.) The percentage of riparian habitat determined to meet Standard 2 has remained unchanged. While the percentage meeting with problems has decreased, there is little change in the individual stream segment ratings. Most of the change in figures is due to removing from consideration one section of the Upper Gunnison River and Spring Creek which flow through Curecanti NRA, removing Long Gulch because it is a dry wash, and removing Cedar Creek due to a minor alteration in the LHA boundary. In addition, Sulphur Gulch was also removed from the riparian category since it is not a naturally occurring riparian area, but is instead entirely supported by irrigation return flow. Increases in the acreage classified as unknown or not evaluated reflect mapped wet areas or ephemeral channels used for irrigation return flows, and are not evaluated against Standard 2. More significant changes include Muddy Creek and Doug Creek, both of which were previously meeting Standard 2 with problems, but intensive beaver activity has improved channel conditions and riparian vegetation in both since then. The Upper Gunnison River was previously identified as having sediment and water imbalances and extensive stands of reed canary grass and tamarisk. Trend studies indicate that the tamarisk is now virtually eradicated, the reed canarygrass has decreased in some areas and increased in others, but sediment and water imbalances appear to remain, and willows are declining. Overall trends are shown in Figure 7.

Large Scale Patterns

To improve our picture of riparian health issues, the land health studies have been grouped into various subdivisions (shown in green type) which can be important at the landscape scale. Data is interpreted below in terms of general patterns (either positive or negative current conditions) observed within individual streams, and in lands with special management designations (see Appendix A.). Trends are also shown for these subdivisions. Similar information on individual allotments is available in Appendix A. Where indicators are not mentioned, no overall pattern was observed.

Streams: **Doug Creek** meets Standard 2 with a static trend. **Iron Canyon** meets Standard 2, although it does not have enough overbank flooding. The **Lower Gunnison River** meets Standard 2, and has high levels of obligate wetland vegetation and minimal levels of exotic species in some areas. **Muddy Creek** meets Standard 2, although it has some issues with lack of overbank flooding and channel morphology. However, these are mitigated by extensive beaver dams. The **North Fork of the Gunnison River** meets Standard 2 with a static trend. It has good levels of both obligate and facultative wetland plant species. Exotic species are declining. **Rawhide Gulch** meets Standard 2 with a static trend, but has some issues with insufficient overbank flooding and poor riparian vegetation age class diversity. The flows in this stream may be dependent on leakage from

Indicators:

Vegetation: vigorous desirable or native species with diverse age classes and structure provide resilience and habitat values to the riparian system, should include facultative and obligate types to indicate presence of adequate water

Roots: plants with woody or extensive fibrous root systems can withstand high streamflows and prevent banks from eroding during floods

Wetted Soils: are necessary to support the riparian plant species, and are indicated by obligate or wetland plant types

Channel Morphology: needs the correct width:depth ratio, sinuosity, and rocks, logs or vegetation to dissipate erosive forces from floods. These features are also needed to accommodate the water and sediment from the watershed, otherwise the stream can shift from a stable but dynamic system to an unstable one

Channel Processes: such as regular flooding and point bar formation needed to maintain riparian vegetation and to dissipate erosive flood energy

STANDARD 2 DETERMINATIONS: INTERPRETATION

the Vernal Mesa Ditch. The **Smith Fork** meets Standard 2 with good levels of wetland obligate species, and few invasive plants. The **Upper Gunnison River** meets Standard 2 with problems, and generally downward trend. While there are abundant wetland obligate and facultative species, there are also problems with insufficient overbank flooding, channel morphology, and invasive species. Trends include generally increasing riparian width and increases in facultative species, introduced species, and riparian trees, but substantial decreases in riparian shrubs—nearly all of it sandbar willow.

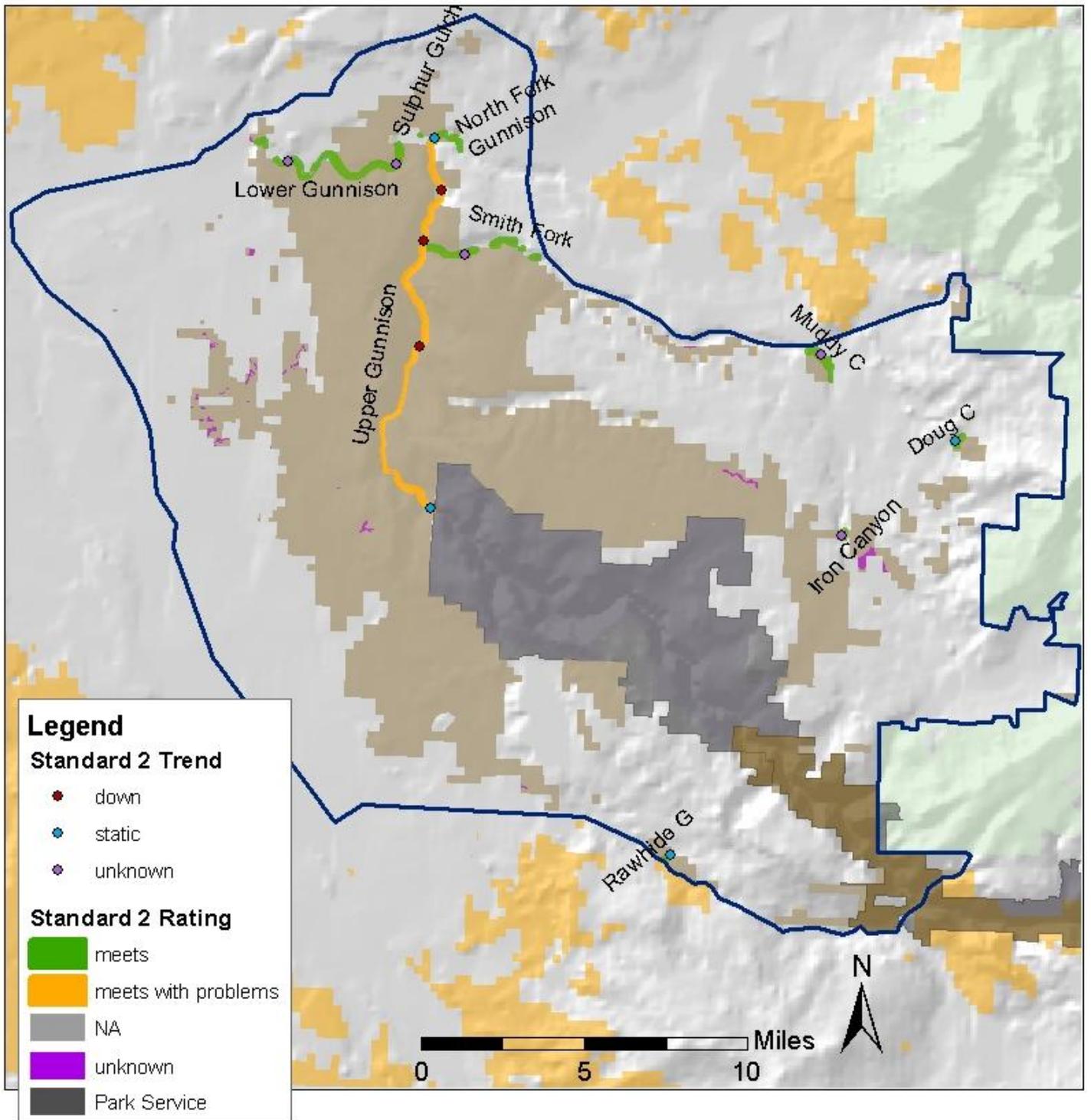
Special Management Areas: The Smith Fork, Lower Gunnison and North Fork in the **Gunnison Gorge NCA** meet Standard 2 while the Upper Gunnison meets with problems. There are generally good levels of facultative and obligate wetland species along these rivers, but also issues with insufficient overbank flooding and channel morphology on the Upper Gunnison. Trends include generally increasing wetland facultative species and riparian trees, and decreasing riparian shrubs. In the **Gunnison Gorge Wilderness**, the Upper Gunnison meets Standard 2 with problems, but the Smith Fork meets Standard 2. There are good levels of wetland obligate species along both rivers, but the same issues of insufficient overbank flooding and channel morphology as found elsewhere on the Upper Gunnison. Increasing riparian width (inward), wetland facultative species and riparian trees and decreasing riparian shrubs mirror trends across the entire Upper Gunnison in the LHA unit. The **Gunnison River SRMA** contains the Lower Gunnison and North Fork segments which meet Standard 2, and a small amount of the Upper Gunnison which meets with problems. In general, within the SRMA there are good levels of wetland obligate and facultative plant species, and generally decreasing levels of introduced species.

Development Analysis

The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. There were very few riparian impacts from the surveyed developments in the Gunnison Gorge unit, largely because they are not located in or near riparian areas. Only campsites in riparian areas showed some levels of impact. These were limited to some campsites which had minor impacts to adjacent riparian vegetation, and minor increases in sediment input to the channel at one site.

STANDARD 2 DETERMINATIONS: TRENDS

Figure 7. Standard 2 Land Health trends map.



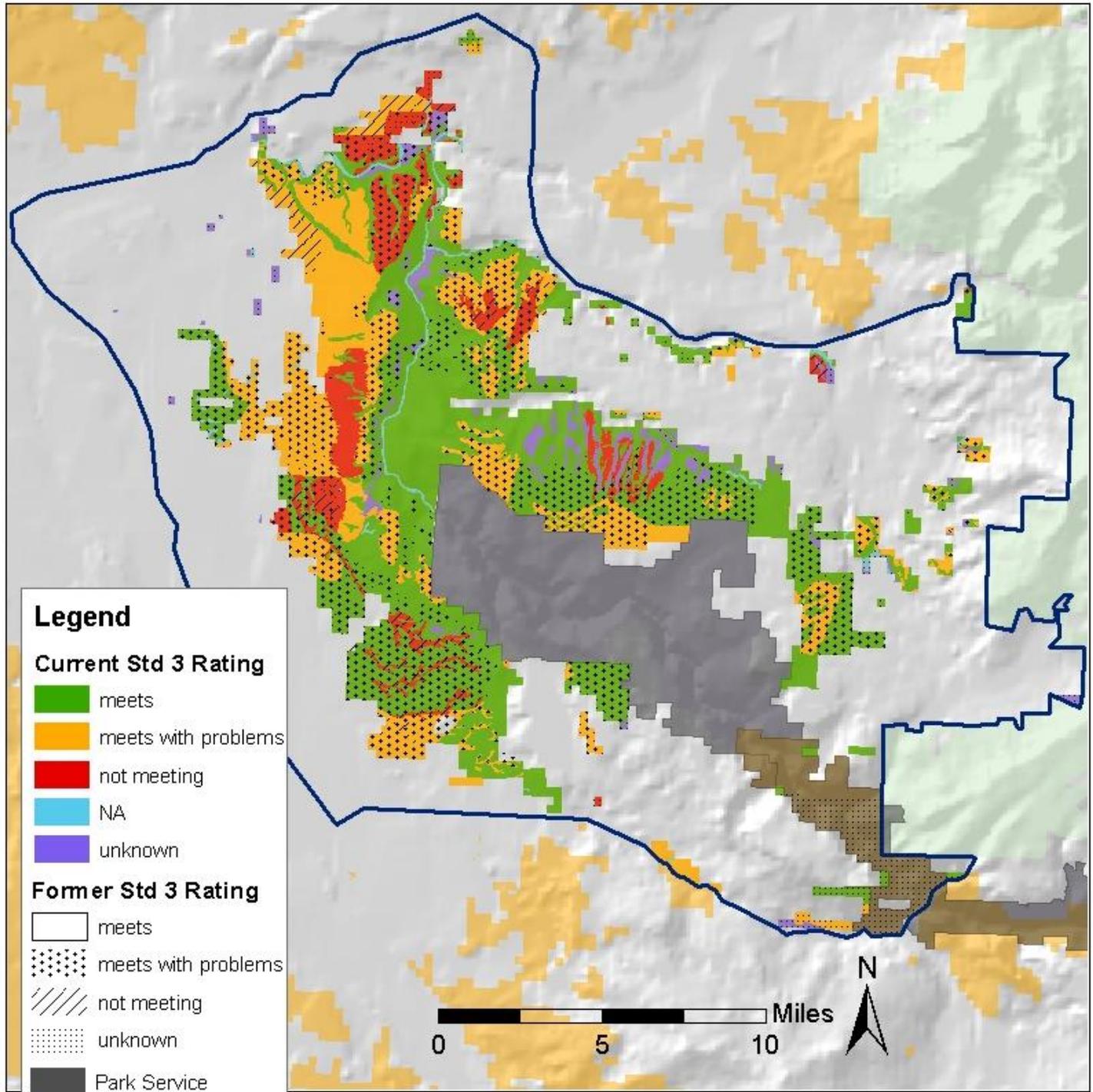
Land Health Determinations

Trends for each Standard 2 Health Category (% of acres in category)

	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
Riparian Trend Up	0%	0%	NA
Riparian Trend Static	14%	45%	NA
Riparian Trend Down	0%	55%	NA
Undetermined	86%	0%	NA

LAND HEALTH DETERMINATIONS FOR STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES

Figure 8. Standard 3 Land Health Determinations map.



Standard 3 Determinations (acres / % of unit)

	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Upland
Current Rating	55,755 / 54%	29,565 / 29%	11,226 / 11%	4,702 / 5%	1,677 / 2%
Former Rating	47,284 / 43%	48,754 / 44%	5,029 / 5%	8,034 / 7%	682 / 1%

STANDARD 3 DETERMINATIONS: INTERPRETATION

Definition: *To meet Standard 3, healthy productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and habitat's potentials. Plants and animals are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.*

Comparison of Current and Former Determinations

Standard 3 Determinations have largely improved since the preceding Land Health Assessment of 2000-2001 (see Figure 8.) Acreage of lands meeting Standard 3 has increased. At the same time, a smaller increase has occurred in lands not meeting Standard 3. Some of this is the result of subdividing lands originally rated as meeting Standard 3 with problems in order to more accurately characterize them, as exemplified in the Crawford Sage Grouse area.

Some of the changes in determinations have been based on changes in Indicator conditions over the past decade. Many of the lands formerly determined to meet Standard 3 with problems had low perennial grass and forb cover, high levels of exotic plant species, poor shrub vigor and severe shrub hedging. Now these lands have no clear indicator patterns other than generally increasing cool season perennial grass, and fewer low vigor shrubs. These improvements helped some of them transition into meeting Standard 3. Lands previously rated as not meeting Standard 3 still generally have low cool season perennial grass cover, low perennial forb cover, and high levels of exotic and/or noxious weeds. On lands formerly meeting Standard 3, conditions now vary, but the majority of sites have high and increasing levels of exotic plants. However, perennial forbs and native plants are also increasing, while there are fewer low vigor and severely browsed shrubs. Overall trends are shown in Figure 9.

Large Scale Patterns

To improve our picture of plant and animal community health issues, the land health studies have been grouped into different subdivisions (shown in green type) which can be important at the landscape scale. Data is interpreted below in terms of general patterns (either positive or negative current conditions) observed within major vegetation types, treatment types, and lands with special management designations (see Appendix A.) Trends are also shown for these subdivisions. Similar information on individual allotments is available in Appendix A. Where indicators are not mentioned, no overall pattern was observed.

Vegetation Types: The limited amount of **Aspen** vegetation meets Standard 3. **Grass-Forb** vegetation does not meet Standard 3. While the few shrubs in this type are generally in good health, there is typically low cool season perennial grass cover, low perennial forb cover, high levels of exotic and/or noxious weeds, and low native plant diversity. Perennial warm season grass, forb, shrub and overall native species cover is generally decreasing, while exotic plant cover is increasing. In general, fewer shrubs are being severely browsed. **Mountain Shrub** vegetation largely meets Standard 3, and shows no overall patterns with current indicator condition. Trends include generally increasing cool season perennial grass and forb cover, and increasing total native species cover, while exotic plant cover is typically declining. The majority of **Pinyon-Juniper** studies are meeting Standard 3 with problems, and shrub condition is the most evident current concern. Cool season perennial grass is generally decreasing, and exotic plants are generally increasing. There are fewer low vigor shrubs, but

Indicators:

Native Plant Diversity: the parts and pieces of the natural system are present.

Cool/Warm Season Perennial Grasses: sunlight and other resources are being used effectively, also an important forage source.

Perennial Forbs: an important habitat and diversity component.

Pinyon-Juniper Invasion and Decline: these can cause changes in the understory and habitat type, and may indicate landscape level imbalances.

Exotic and Noxious Species: indicate loss of biodiversity, site productivity and habitat value.

Shrub Vigor and Hedging: indicates overall health and sustainability of the shrub stand.

Habitat Connectivity: allows for migration, genetic interchange, and resilience to disturbances which are important for sustaining viable populations of plant and animal species.

STANDARD 3 DETERMINATIONS: INTERPRETATION

more severely browsed shrubs. The majority of Sagebrush vegetation studies have problems with Standard 3, most notably associated with shrub stand condition. However, cool season perennial grass, perennial forb, and total native species cover is generally increasing. The majority of Saltdesert Shrub vegetation studies either do not meet Standard 3, or meet Standard 3 with problems. This community generally has low perennial forb cover, and high levels of exotic and/or noxious weeds. While cool season perennial grass is increasing and there are fewer low vigor shrubs overall, exotic plant cover is generally increasing.

The changes and trends within vegetation communities do not indicate expansion or contraction of any major vegetation type has occurred within the Gunnison Gorge unit over the past decade. We have not seen transition of any type as would occur with wide spread fire, extended drought, or other large scale disturbance. At a smaller scale, ongoing removal of young trees from sage grouse areas is likely to avert transitions from sagebrush to woodland in treated areas. In addition, more subtle changes within vegetation types may cause gradual transitions over time, for example from saltdesert shrub to grass-forb vegetation. Such changes are anticipated to occur with climate change.

Vegetation Treatments: Brushbeat treatments meet Standard 3, and generally have high cool season perennial grass cover, but browse stand problems, and tree stand problems as well. Perennial cool season grasses and forbs as well as shrubs and native species are increasing overall, exotic plant species are generally decreasing, and there are fewer severely hedged shrubs. Pinyon-Juniper removal treatments are divided between meeting Standard 3 and meeting with problems. They generally have browse stand problems, but increasing perennial cool season grass, tree, and native plant cover. There are increasing numbers of severely browsed shrubs, however. Plow and Seed treatments do not meet Standard 3, primarily because of the dominance of their seeded, nonnative grasses. They generally have low warm season perennial grass cover, high levels of exotic grass cover, and browse stand problems. Cool season perennial grass and native species cover are generally decreasing, but there are fewer severely browsed shrubs. Prescribed Fire treatments generally meet Standard 3, but typically have low cool season perennial grass cover. Perennial cool season grass, perennial forbs, native plants and shrubs are generally increasing, and exotics are decreasing. Rollerchop treatments are divided between meeting Standard 3 and meeting with problems, but show no overall patterns with current indicator condition. Trends show generally increasing shrubs and decreasing exotic plant cover. There are also fewer shrubs in low vigor. Wildfires generally meet Standard 3, with the exception of the Fruitland Fire, which does not meet. They generally have low perennial forb cover, and browse stand problems. Perennial forbs are generally decreasing, as are exotic plants, and native plant cover is generally increasing. There are fewer shrubs in low vigor, but more shrubs that are severely hedged. Most of the Untreated vegetation is either meeting Standard 3 with problems or not meeting it, perhaps because much of this category is made up of saltdesert vegetation. Untreated vegetation generally has high levels of exotic and/or noxious weeds. Perennial cool season grass is increasing and there are fewer shrubs in low vigor, but exotic plant cover is also increasing.

Special Management Areas: Fairview ACEC meets Standard 3 with problems and generally has low cool and warm season perennial grass cover, low perennial forb cover, high levels of exotic and/or noxious weeds, and low native plant diversity. No trend information is available. The majority of Flat Top/ Peach Valley SRMA studies either do not meet Standard 3 or meet with problems. While there is generally good shrub stand health, there are high levels of exotic and/or noxious weeds. Cool season perennial grass is generally increasing, but shrubs and overall native species cover are decreasing. The majority of Gunnison Gorge NCA studies either do not meet Standard 3 or meet with problems. They show no overall indicator patterns other than exotic plants which are generally increasing, and native plants are generally decreasing. There are fewer low vigor shrubs however. The Gunnison Gorge Wilderness generally meets Standard 3 and has low exotic plant cover, but low perennial forb cover as well. The Gunnison River SRMA studies either do not meet Standard 3, or meet with problems. Widespread problems include low cool season perennial grass cover, low perennial forb cover, and high levels of exotic and/or noxious weeds. While there are fewer low vigor shrubs and perennial cool season grass is

STANDARD 3 DETERMINATIONS: INTERPRETATION

generally increasing, so are exotic plants, and native plants are decreasing. The majority of the **Gunnison Sage Grouse ACEC** meets Standard 3, but there are many problem areas as well. In general, studies show low perennial forb cover, and browse stand problems, but no clear trends. The **Native Plant ACEC** studies either do not meet Standard 3, or meet with problems. While browse health is generally good, problems include low cool season perennial grass cover, low warm season perennial grass cover, low perennial forb cover, high levels of exotic and/or noxious weeds, low native plant diversity, and tree stand problems. While there are fewer low vigor shrubs and cool season perennial grasses are generally increasing, exotic plants are increasing, and warm season grass, perennial forbs, native plants and shrubs are generally decreasing.

Development Analysis

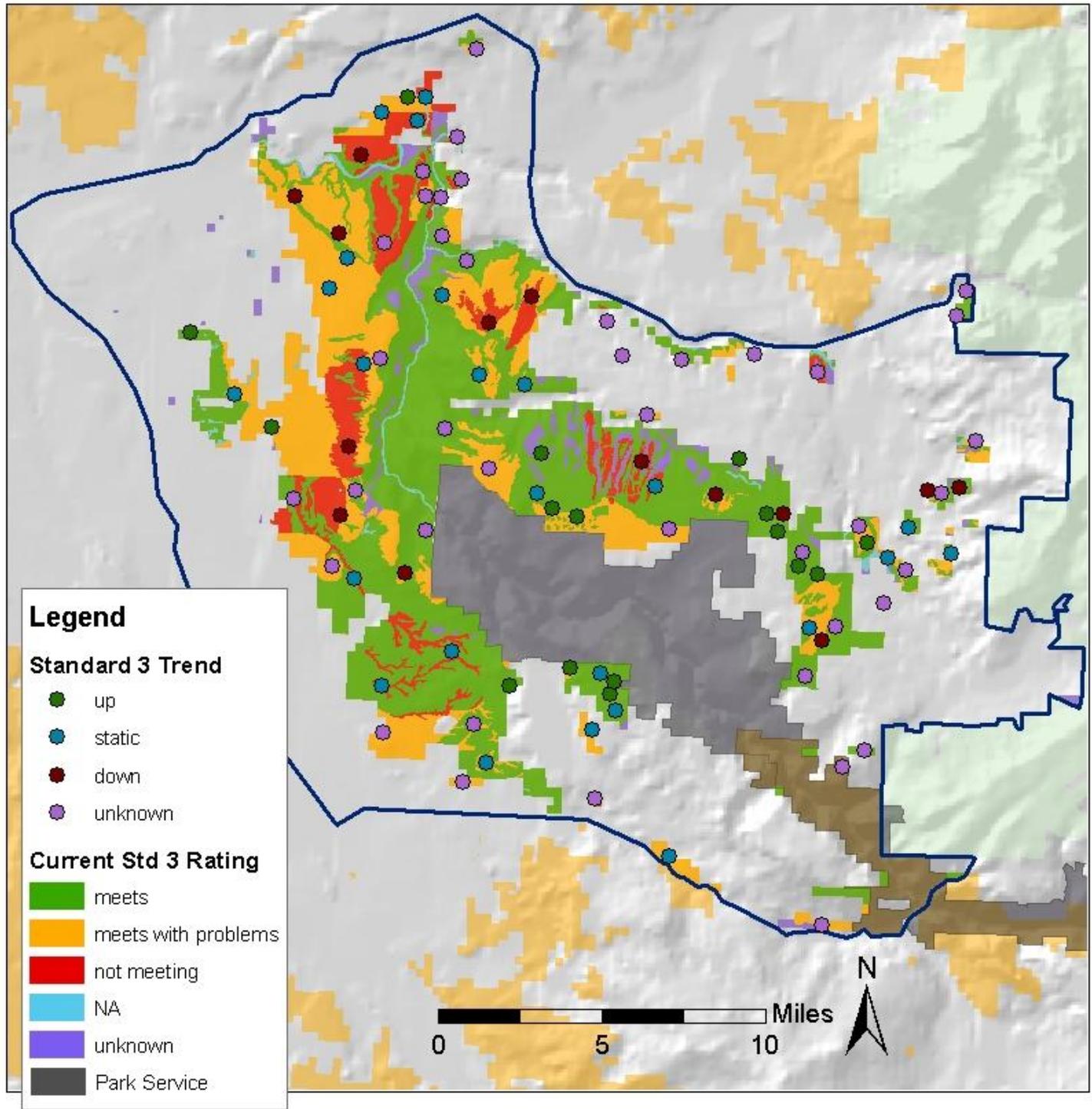
The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. The following types of developments impacted adjacent plant and animal community indicators at levels worth noting. Asterisked developments are moderately to widely distributed across the unit, and may be contributing to land health issues on the landscape:

- * **Native Vegetation**-Often reduced by abandoned mines, cattleguards and corrals, contour furrows and check dams*, developed recreation sites*, ditch Rights of Way, gas wells, mineral developments, and road and highway Rights of Way*. Sometimes reduced by BLM routes*, campsites*, communications sites, power and phone Rights of Way, and reservoirs/stock ponds*.
- * **Weeds**-Usually increased next to abandoned mines, BLM routes*, campsites*, cattleguards and corrals, contour furrows and check dams*, developed recreation sites*, ditch Rights of Way, gas wells, mineral developments, power and phone Rights of Way, reservoirs/stock ponds*, and road and highway Rights of Way*. Sometimes increased near communications sites, and fences*.
- * **Wildlife**-Usually exposed to hazards near cattleguards and corrals, communication sites, contour furrows and check dams*. Sometimes exposed to hazards at fences* and road and highway Rights of Way*.
- * **Connectivity**-generally reduced by road and highway ROWs*, sometimes affected by contour furrows and check dams*, fences*, and power and phone ROWs.

STANDARD 3 DETERMINATIONS: TRENDS

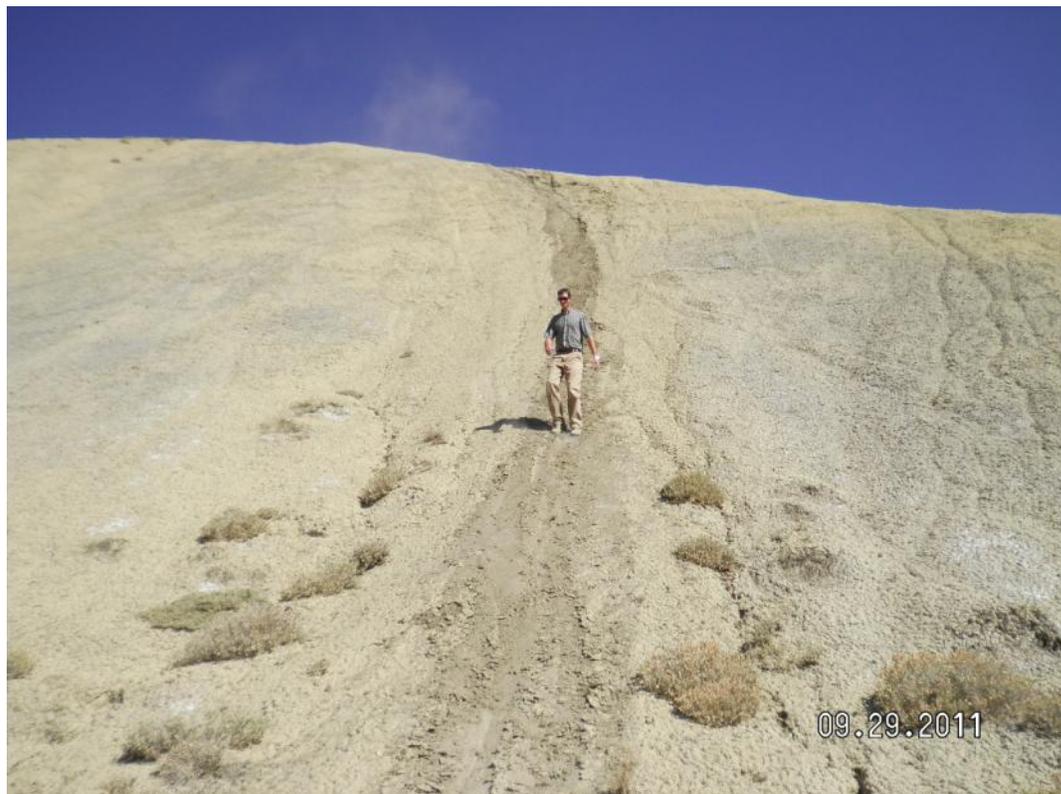
Figure 9. Standard 3 Land Health trends map.

Land Health Determinations



Trends for each Standard 3 Health Category (% of acres in category)

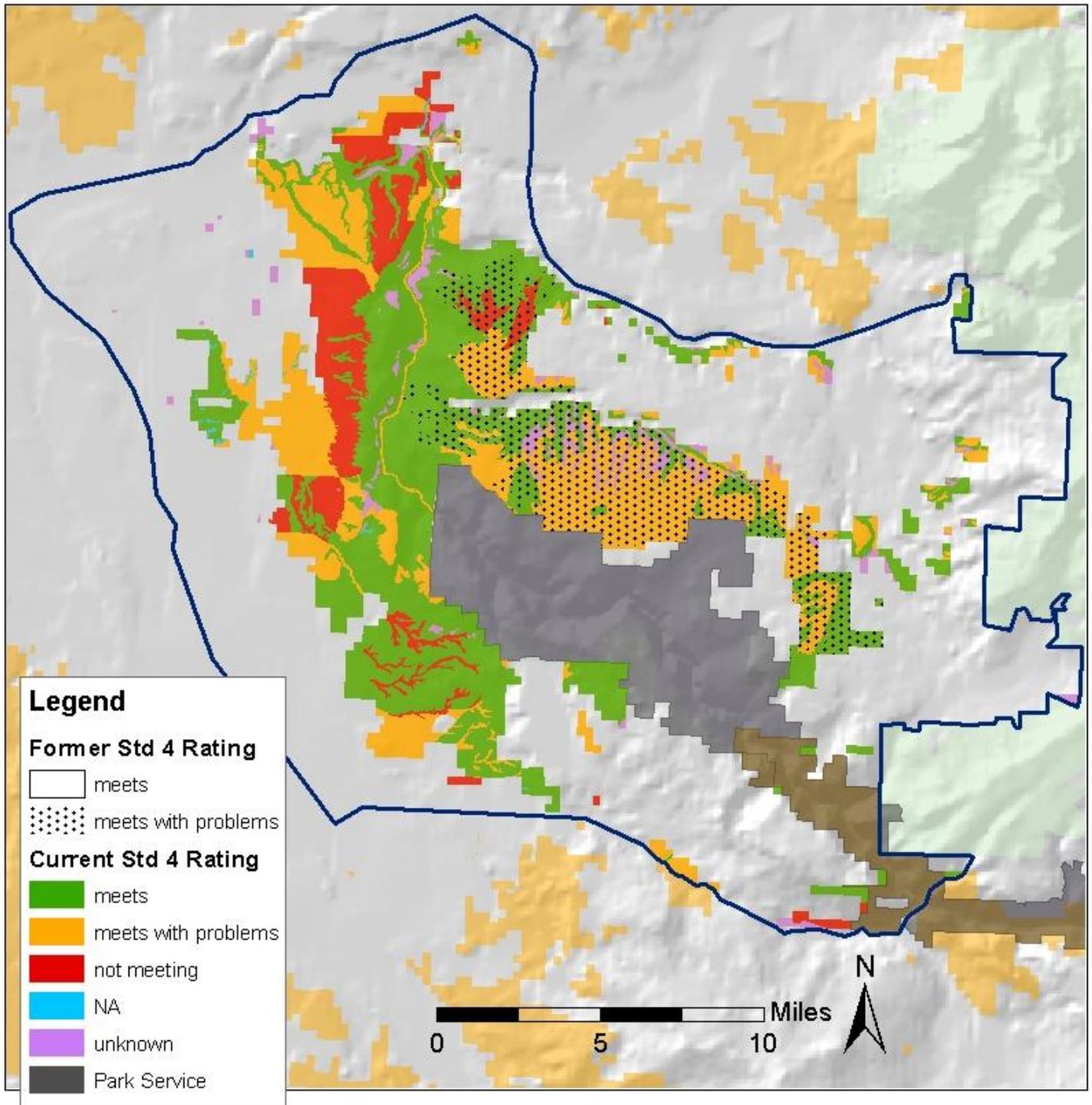
	Land which meet or exceed	Lands which meet with problems	Lands which are not meeting
Vegetation Trend Up	47%	17%	0%
Vegetation Trend Static	29%	34%	34%
Vegetation Trend Down	2%	19%	40%
Undetermined	23%	30%	26%



The adobes, formed from weathered Mancos shale, create a unique and challenging environment for plant growth. Damage to these soils and communities is difficult to rehabilitate, and scars generate long-term erosion and weed invasion concerns, both in areas where planned activities take place as in the constructed site (top) and the unauthorized route (below).

LAND HEALTH DETERMINATIONS FOR STANDARD 4 SPECIAL STATUS SPECIES

Figure 10. Standard 4 Land Health Determinations map.



	Standard 4 Determinations (acres / % of unit)				
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Applicable
Current Rating	51,234 / 50%	33,627 / 33%	12,805 / 12%	4,936 / 5%	322 / <0.5%
Former Rating	83,352 / 76%	26,431 / 24%	0 / 0%	0 / 0%	0 / 0%

STANDARD 4 DETERMINATIONS: INTERPRETATION

Definition: *To meet Standard 4, special status, threatened, and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.*

¹TES Species– Special Status Species which includes federally threatened, endangered, proposed, and candidate species and BLM sensitive species

Comparison of Current and Former Determinations

Standard 4 Determinations have changed since the preceding Land Health Assessment of 2000-2001 (see Figure 10.) Acreage of lands not meeting and meeting Standard 4 with problems has increased greatly, largely as a result of a new, more intensive approach for this standard than was used in the past. Now, Standard 4 determinations are more closely tied with Standard 3 determinations which can indicate habitat concerns where there are TES species, especially when detailed population information is not known. In the past assessment, lands were typically judged as meeting Standard 4 when specific information on TES species was lacking.

Some of the changes in determinations are based on TES concerns which have emerged over the past decade. For example, white tail prairie dogs are now considered a sensitive species, and this caused areas of degraded habitat or plague-killed colonies to have a lower Standard 4 determination. Other areas experienced changes in indicator status. For example, areas occupied by the Threatened Colorado hookless cactus and Endangered clay-loving buckwheat were determined to not meet Standard 4, or meet with problems based on increasingly degraded habitat from exotic annuals. Breeding bird surveys were also conducted for the first time in the LHA unit to incorporate migratory bird concerns. If areas were found to contain exotic bird species or brown-headed cowbirds, this factor was also taken into account in assessing Standard 4. Other lands which were originally rated as meeting Standard 4 with problems due to the generally declining Gunnison sage grouse population have been subdivided to more accurately characterize them, with some subdivisions now determined to be meeting Standard 4 due to genuinely improving vegetation conditions, and others to not meet this standard due to worsening habitat. Overall trends are shown in Figure 11.

Large Scale Patterns

To improve our picture of TES species and habitat health issues, the land health studies have been grouped into various subdivisions (shown in green type) which can be important at the landscape scale. Data is interpreted below in terms of general patterns (either positive or negative current conditions) observed within major vegetation types, treatment types, lands with special management designations, and streams (see Appendix A.) Trends are also shown for these subdivisions. Similar information on individual allotments is available in Appendix A. Where indicators are not mentioned, no overall pattern was observed.

Vegetation Types: **Aspen** vegetation meets Standard 4. **Grass-Forb** vegetation generally does not meet Standard 4. The TES habitat values of this community are typically degraded by weeds and lack adequate native plants. Exotic species are increasing, while native plants, including cool season grasses and perennial forbs are generally declining. **Mountain Shrub** vegetation is about evenly divided between meeting Standard 4 and meeting with problems, but shows no overall patterns with current indicator condition. Trends show generally decreasing exotic species, which reduces threats to TES habitat. The majority of Pinyon-Juniper studies are meeting Standard 4 with problems, but again, there is no overall pattern of current indicator condition within this vegetation type. However, weeds are generally increasing. In Gunnison sage grouse habitat within the pinyon-juniper vegetation type, perennial forbs and

Indicators:

Standard 3: All the indicators listed for Standard 3 apply

Populations of Endemic and Protected Species: should be stable and increasing in suitable habitat

Suitable Habitat: should be available for recovery of endemic and protected species

STANDARD 4 DETERMINATIONS: INTERPRETATION

sagebrush are generally increasing, but perennial grass cover is declining, although there are few studies to base this on. A small majority of the studies in riparian vegetation meet Standard 4. In general, current indicator conditions indicate some concerns with altered water temperature and flow patterns reducing habitat quality for sensitive native warm water fish species. The majority of sagebrush vegetation studies have problems with or do not meet Standard 4, but there are no overriding Standard 4 indicator concerns across this vegetation type. Native plant cover is generally increasing throughout this vegetation type. Within Gunnison sage grouse habitat, perennial forb cover shows an increasing trend. The majority of Saltdesert Shrub vegetation studies either do not meet Standard 4, or meet Standard 4 with problems. This community generally has problems with invasive weeds degrading habitat quality for TES. The only clear trend in this habitat type is one of increasing cover of exotic plants.

Vegetation Treatments: Brushbeat treatments meet Standard 4 with problems, and generally have low forb, sagebrush and other shrub cover in Gunnison sage grouse habitat. Nevertheless, trends are positive for TES species, particularly sage grouse, and include generally decreasing exotic species and increasing native species, including perennial cool season grasses, forbs, and sagebrush. Pinyon-Juniper Removal treatments meet Standard 4 with problems. They generally have low cover of perennial forbs, sagebrush, and other shrubs. Trend data from the one study in sage grouse habitat indicates increasing native species cover, but declining cover of perennial forbs and sagebrush. Plow and Seed treatments do not meet Standard 4, or meet with problems, in part due to the dominance of the seeded, nonnative grass. They generally have low cover of perennial forbs, sagebrush and other shrubs. Cool season perennial grass cover and cover of native plants are generally decreasing in these old treatments. Prescribed Fire treatments generally meet Standard 4. Weeds are decreasing for the most part in these treatments, and native plant cover and sagebrush cover is increasing. Rollerchop treatments generally do not meet, or meet Standard 4 with problems, and typically have low cover of forbs and shrubs other than sagebrush. Weeds appear to be increasing overall in this treatment type. Wildfires meet Standard 4, with the exception of the Fruitland Fire, which does not meet. They show no overall TES indicator condition concerns. Weeds are generally increasing, but so is native plant cover. Within sage grouse habitat, the one wildfire trend study shows declining perennial grass and forb cover. Most of the Untreated vegetation is either meeting Standard 4 with problems or not meeting it, perhaps because much of this category is made up of saltdesert vegetation, which has vegetation issues. There are no overarching TES indicator concerns in this category, although weeds are generally increasing. In untreated vegetation in sage grouse habitat, however, perennial forbs show increasing cover.

Special Management Areas: Fairview ACEC does not meet Standard 4 and has problems with weeds degrading endangered clay-loving buckwheat habitat. It appears that Russian knapweed prefers the same micro habitat that buckwheat occupies and without intervention it is likely that knapweed will continue to expand and displace buckwheat. In 2002 BLM first identified an approximately 0.10 acre knapweed infestation establishing within the North Fairview ACEC as of June 2011 that infestation has grown to approximately 6 acres in size and is within 10 meters or less of buckwheat populations. The majority of Flat Top/Peach Valley SRMA studies either do not meet Standard 4 or meet with problems. Weeds generally degrade TES habitat quality, and native plants show overall declines. Many land health studies in the Gunnison Gorge NCA either do not meet Standard 4 or meet with problems. No single problematic indicator was noted, but weeds are generally increasing and native plants are declining, which increasingly threatens TES habitat quality over time. Within Gunnison sage grouse habitat, perennial cool season grass cover is generally declining. The Gunnison Gorge Wilderness generally meets Standard 4. The majority of Gunnison River SRMA studies either do not meet Standard 4, or meet with problems. Current TES indicator concerns center on high levels of exotic plants which degrade TES habitat. Furthermore, the exotic plants show a generally increasing trend. The majority of the Gunnison Sage Grouse ACEC meets Standard 4 with problems. Low perennial forb cover for sage grouse is the only TES indicator that currently is a widespread issue within the ACEC, however forb cover is generally increasing throughout the ACEC. Studies in the Native Plant ACEC either do not

STANDARD 4 DETERMINATIONS: INTERPRETATION

meet Standard 4, or meet with problems. Current concerns with TES indicators center on weeds which degrade TES plant habitat. The one study in the ACEC with trend information shows declining conditions for TES habitat condition, with increasing exotic species cover and declining native plant cover.

Streams: **Doug Creek** meets Standard 4. **Iron Canyon** meets Standard 4, although it does have some issues with altered water temperature and flow regimes for sensitive warm water fish species. The **Lower Gunnison River** meets Standard 4. **Muddy Creek** meets Standard 4, although it has some concerns with altered water temperature and flow regimes for sensitive warm water fish species. The **North Fork of the Gunnison River** meets Standard 4 with problems, primarily because cold water temperatures create habitat concerns for native warm water fish species. **Rawhide Gulch** meets Standard 4 with a static trend. The **Smith Fork** meets Standard 4. The **Upper Gunnison River** meets Standard 4 with problems, and generally downward trend. River flow and water temperature alterations degrade habitat quality for sensitive warm water fish species, and declining willows indicate degrading riparian conditions over time.

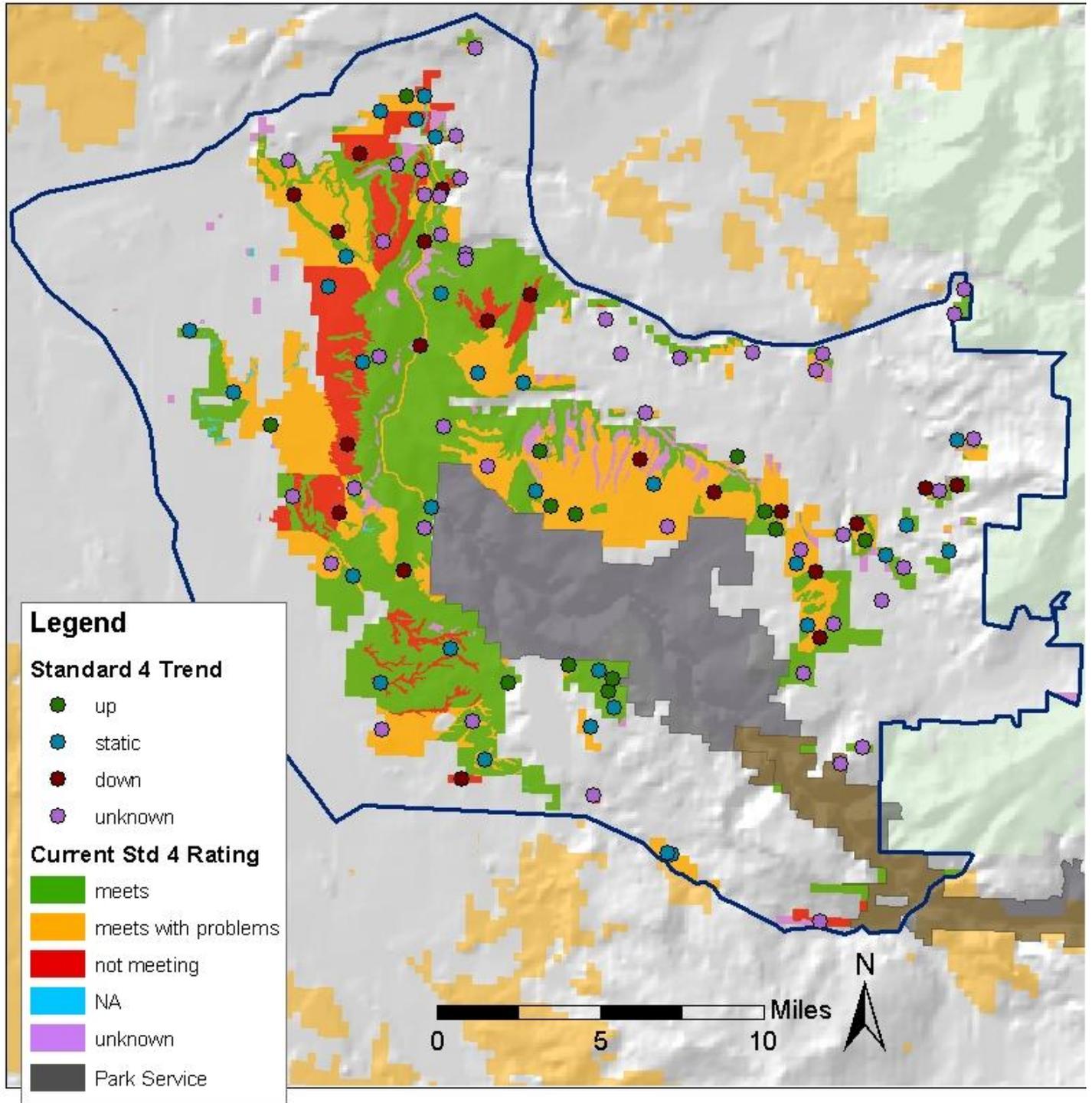
Development Analysis

The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. The following types of developments impacted adjacent TES species indicators at levels worth noting. Asterisked developments are moderately to widely distributed across the unit, and may be contributing to land health issues on the landscape:

- * **TES plants or animals**- Occasionally subject to damage, injury or death at fences* and road and highway Rights of Way*.
- * **TES Habitat**- Damaged by abandoned mines (although these are very infrequent in the unit), and occasionally damaged by BLM routes*, fences* and road and highway Rights of Way*. Additionally, human presence on roads may reduce the availability of habitat to wildlife species.

STANDARD 4 DETERMINATIONS: TRENDS

Figure 11. Standard 4 Land Health trends map.



Trends for each Standard 4 Health Category (% of acres in category)

	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
TES Indicator Trend Up	18%	33%	0%
TES Indicator Trend Static	47%	22%	46%
TES Indicator Trend Down	2%	22%	30%
Trend Undetermined	34%	23%	24%

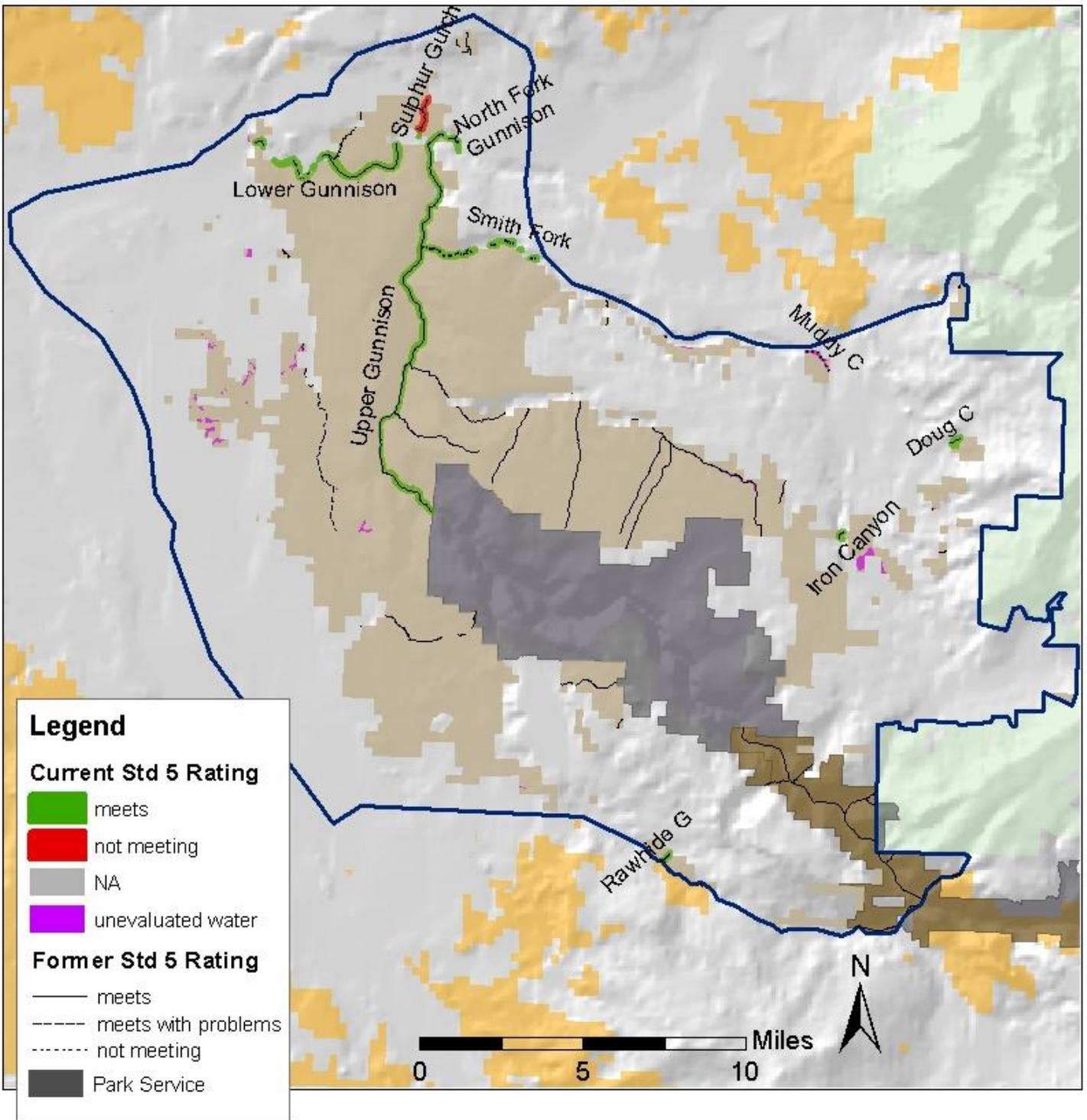


Gunnison sage grouse are listed on the Colorado BLM State Sensitive Species List. An important satellite population inhabits the eastern side of the Gunnison Gorge unit. A sage grouse nest in the Crawford Sage Grouse ACEC shown at top, and a strutting male shown on the lek at bottom.

LAND HEALTH DETERMINATIONS FOR STANDARD 5 WATER QUALITY

Figure 12. Standard 5 Land Health Determinations map.

Land Health Determinations



Standard 5 Determinations (acres or miles/ % of streams)

	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Uplands
Current Rating	1,052 ac./ 64%	0 ac. / 0%	52 ac. / 3%	573 ac./ 33%	101,248 ac./ NA
Former Rating	75 miles / 89%	5 miles / 6%	4 miles / 5%	0 miles / 0%	NA

STANDARD 5 DETERMINATIONS: INTERPRETATION

Definition: *To meet Standard 5, the water quality of all water bodies, including groundwater where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado.*

Comparison of Current and Former Determinations

Standard 5 Determination amounts and percentages have changed in comparison with the preceding Land Health Assessment of 2000-2001 (see Figure 12.) The percentage of stream area determined to meet Standard 5 has declined, and the percentage having problems has declined as well, but most of these declines reflect changes in segments and waters which were considered pertinent to Standard 5. For those segments assessed in both LHAs, there is little change in the individual stream segment ratings. Most of the change in figures is due to removing from consideration the ephemeral drainages, and adding in areas classified as wet or water in the Paonia Soil Survey. The most significant remaining changes include the Smith Fork which was originally classified as not meeting Standard 2 due to high total dissolved solids, high temperatures, and no visible evidence of aquatic insects, but when tested (upstream) in 2011 it showed aquatic insects and better water quality. In addition, Muddy Creek, which was previously determined to not meet Standard 2, is now classified as unknown based on discussions with the Bureau of Reclamation regarding their management of Crawford Reservoir and the water quality measurements they have made. Lastly, Sulphur Gulch, which was originally classified as meeting Standard 5 due to surrounding soil characteristics has now been determined to not meet the standard due to extremely high salinity, selenium, and sulfates found through water quality analysis. Currently, we do not have adequate information for a more complete analysis of trends.

Large Scale Patterns

To improve our picture of water quality issues, the land health studies have been grouped into various subdivisions (shown in green type) which can be important at the landscape scale. Data is interpreted below in terms of general patterns (either positive or negative current conditions) observed within individual streams, and in lands with special management designations (see Appendix A.) Similar information on individual allotments is available in Appendix A. Where indicators are not mentioned, no overall pattern was observed.

Streams: The **Lower Gunnison River** meets Standard 5 with a static trend, and has good HBI macroinvertebrates. The **North Fork of the Gunnison River** meets Standard 5. It has good levels of EPT macroinvertebrates, but has concerns with HBI macroinvertebrates. **Rawhide Gulch** meets Standard 5 and has no visible or state-listed evidence of water quality problems. The **Smith Fork** meets Standard 5 with a static trend. It has good watershed soil conditions, but concerns with salinity and EPT macroinvertebrates. The **Upper Gunnison River** meets Standard 5 with static or unknown trends. It has good EPT macroinvertebrates, but concerns with HBI macroinvertebrates in some areas. There are areas along its reach where watershed soil conditions are notably good and road density (an important source of sediment) is particularly low. **Doug Creek** and **Iron Canyon** were not evaluated for water quality. **Muddy**

Indicators:

Algae: appropriate levels are present; excess levels indicate water quality problems

Contaminants (E. coli bacteria): levels should be within the amounts directed by the State of Colorado; excess levels may pose a health hazard

Macroinvertebrates (aquatic insects): appropriate populations are present: EPT macroinvertebrates are a measure for detecting pollutants (low numbers indicate likely pollutants), while HBI macroinvertebrates (higher numbers) indicate nutrient loading, sedimentation, low oxygen and warmer temperatures

Pollutants: constituents with concentrations exceeding State of Colorado beneficial use standards are flagged such as selenium.

Sediment: soil surface indicators are used as surrogates to determine the potential for suspended sediment loading. Indicators include, ground cover and road network density.

STANDARD 5 DETERMINATIONS: INTERPRETATION

Creek was also not evaluated for water quality but was placed on the 2012 303(d) list for E. coli.

Special Management Areas: The Smith Fork, Upper and Lower Gunnison and North Fork in the Gunnison Gorge NCA meet Standard 5, but Sulphur Gulch does not meet this standard. The majority of these streams have good EPT macroinvertebrates, indicating a lack of chronic pollutant contaminations. Water quality problems are isolated to salinity and selenium concerns in Sulphur Gulch (and likely Lawhead Gulch). Significant selenium concentrations were measured in Sulphur Gulch. There were minor EPT and HBI macroinvertebrate concerns at a small proportion of sampled sites in the NCA. In the Gunnison Gorge Wilderness, both the Smith Fork and the Upper Gunnison meet Standard 5. Elevated salinity concentrations were measured in the Smith Fork. In general, there are good levels of EPT macroinvertebrates and some areas with notably good watershed soil conditions and low road densities. However, there are also concerns with HBI macroinvertebrates in some areas. The Gunnison River SRMA contains the Lower Gunnison, North Fork, and a small amount of the Upper Gunnison, all of which meet Standard 5. The SRMA also includes Sulphur Gulch, which does not meet Standard 5. The SRMA generally has good levels of HBI macroinvertebrates.

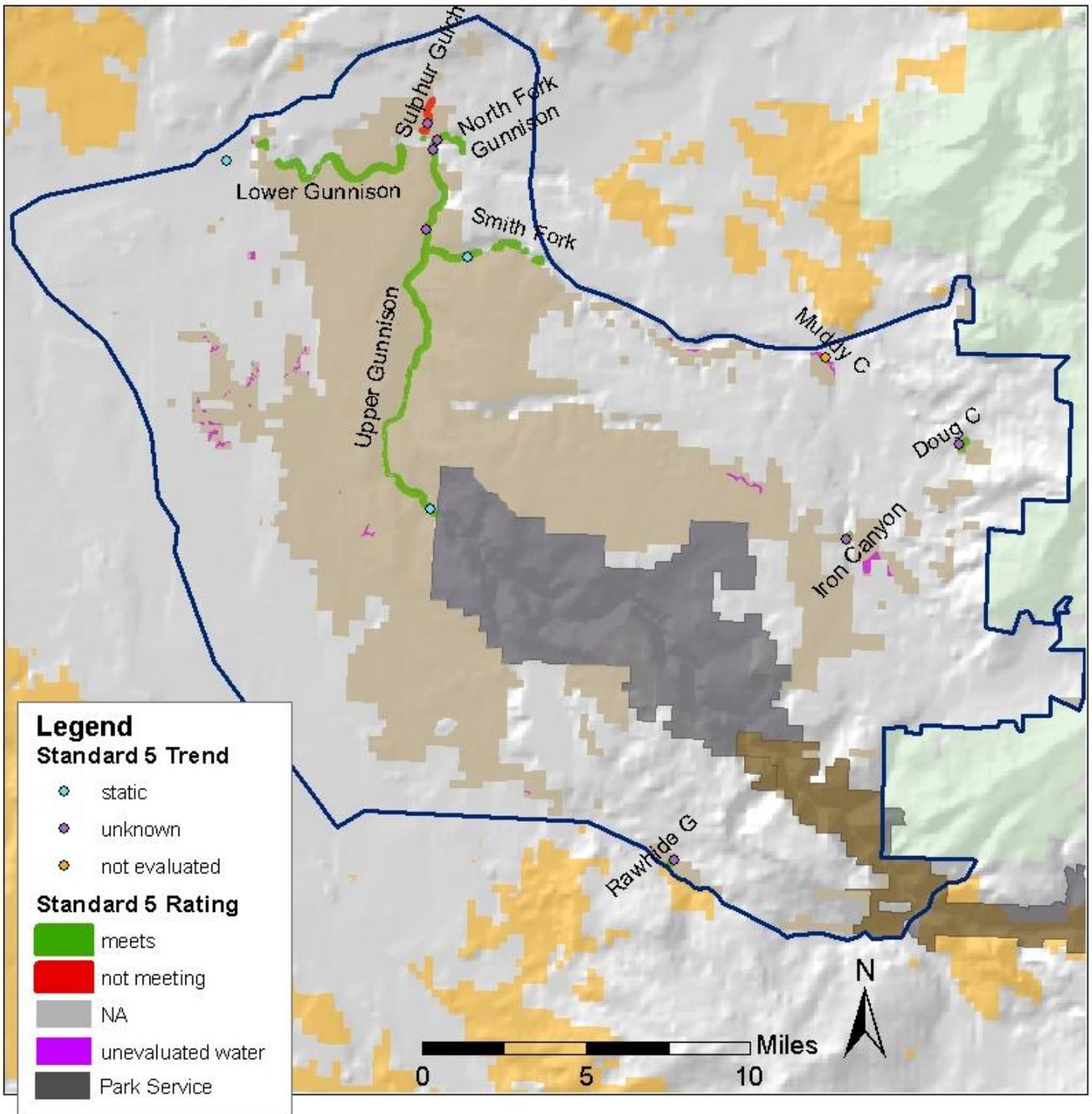
Development Analysis

The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. The following types of developments showed potential degradation to water quality indicators at levels worth noting. Asterisked developments are moderately to widely distributed across the unit, and may be contributing to land health issues on the landscape:

- * **Pollutants**-were a concern at abandoned mine sites and gas wells and pads, however these developments are very scarce in the Gunnison Gorge unit. Low levels of pollutants were occasionally associated with BLM routes* and road and highway Rights of Way*, particularly from spills of oil and other vehicle fluids.
- * **Sediment**-excess generation and mobilization of sediment was an issue at abandoned mine sites, contour furrows and check dams*, and road and highway Rights of Way*. Excess sediment was also generated or mobilized at some BLM routes*, campsites*, developed recreation sites*, and livestock ponds*, although not at the majority of these developments.
- * **Algae**-Low levels were associated with livestock ponds*.

STANDARD 5 DETERMINATIONS: TRENDS

Figure 13. Standard 5 Land Health trends map.



Land Health Determinations

Trends for each Standard 5 Health Category (% of acres in category)

	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
Water Quality Trend Up	0%	NA	0%
Water Quality Trend Static	77%	NA	0%
Water Quality Trend Down	0%	NA	0%
Trend Undetermined	23%	NA	100%

CAUSAL FACTORS—OVERVIEW

Definition: Causal factors are the conditions (i.e. activities, land uses, or natural phenomena) which are responsible for land health problems. These can occur singly or more often in combination with one another. They have been divided into landscape-level causal factors which influence land health broadly across the Gunnison Gorge unit, and site-specific contributing factors which have a more localized influence.

Explanation of Approach:

An understanding of the factors which are causing land health problems across the Gunnison Gorge landscape unit as well as at the site level is important for developing effective remedies. Causal factors are determined from an analysis of evidence observed at the undeveloped areas where land health data was collected.

A separate Development Analysis provides additional understanding of developments. It looks at how these site-specific land uses influence land health at the site level and potentially contribute to problems at the landscape level. The Development Analysis also provides information on development condition and compliance with authorizations.

This dual approach provides the foundation for identifying remedies at specific locations on the landscape, and remedies that relate to UFO's broader processes and authorizations. This page includes information about common factors found in the Gunnison Gorge unit, as well as information about developments and their status. The following pages detail causal and site-specific contributing factors for each standard.

Causal and Contributing Factors:

The causes behind land health are often complex and intermingled. In this analysis, factors which appear strongly tied to health problems across the landscape are considered causal factors, while factors which are found only occasionally at sites with health problems are considered contributing factors. Complicating analysis is the fact that factors which appear on sites with health problems can also appear on sites which meet health standards. Therefore, depending on the situation, many factors which contribute to health problems can be compatible with meeting land health in other situations.

In the Gunnison Gorge unit, factors commonly observed include:

- BLM routes
- Current grazing (mainly from cattle, sheep, deer and elk, based on observations of droppings and degree of browse and grass utilization and hedging)

- Drought (most recently occurred between 2000-2002, lasting effects visible as dead and/or low vigor trees and shrubs)
- Domestic sheep allotments (encompassing grazing, disturbance from bed grounds and impacts from concentrated trailing)
- Wildfire
- Fire suppression impacts (lack of burning)
- Historic grazing (livestock and wildlife)
- Neighboring agricultural or residential land
- Noxious or invasive weeds
- Recent vegetation treatments (and prescribed burns)
- OHV use (off-route)
- Older vegetation treatments
- Pinyon-juniper invasion
- Recreation impacts
- Road and highway ROWs
- ROWs (excluding roads)
- Seral stage of the vegetation
- Woodcuts
- Augmented streamflows
- Flood deposition
- Flow regulation from dams
- Intermittent flows
- Irrigation tailwater
- Road encroachment into riparian areas
- Upstream channel condition impacts
- Upstream water quality impacts
- Water diversions
- Wildlife use in riparian areas

The influences these factors have on each of the Land Health Standards is described on the following pages. Additional analysis of causal factors should be covered through NEPA analysis that accompanies permit renewal and project planning.

Development Analysis:

The following development types in the Gunnison Gorge unit are occasionally associated with impacts to land health indicators. The percentage of each type found to have issues with condition or compliance at sampled sites is shown in parentheses. It is re-

CAUSAL FACTORS—OVERVIEW

sonable to assume that the design, implementation, or maintenance of at least some of these developments could be contributing to Land Health problems:

- * Abandoned mines (50%)
- * BLM authorized routes (24%)
- * BLM closed routes (80%)
- * Campsites (13%)
- * Cattleguards and corrals (100%)
- * Communications site ROWs (33%)
- * Contour furrows and check dams (100%)
- * Developed recreation sites (60%)
- * Ditch ROWs (50%)
- * Fences (63%)
- * Gas well pads (0%)
- * Mineral developments (50%)
- * Power / telephone line ROWs (50%)
- * Road and highway ROWs (31%)
- * Stock ponds (75%)

STANDARD 1 SOILS: CAUSAL FACTORS

Definition: *Landscape-level causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with soil health problems, and therefore are likely impacting soil health most broadly across the Gunnison Gorge unit. Site-specific contributing factors are defined as the remaining conditions observed at moderate or higher levels at individual study sites which have soil health problems. Development analysis identifies possible links between developments and soil health.*

Landscape Level Causal Factors

Within the Gunnison Gorge unit, the following factors were found to occur much more frequently in lands not meeting Standard 1, or meeting with problems. We can conclude that they are at least partly responsible for current conditions, although they also occurred on some sites meeting Standard 1:

- * **Noxious and invasive weeds**, which were documented at moderate or high levels on 66% of soil problem sites (but were also present at 36% of sites meeting Standard 1). These are mainly exotic, annual species which create abnormally high litter levels.
- * **Domestic sheep grazing allotments** encompassed 65% of sites with soil problems (but were also present at 33% of sites meeting Standard 1). These have been permitted for sheep grazing for at least several decades. Bedgrounds and heavily used trailing areas have disturbed enough area that soil health indicators are impacted at a detectable level
- * **Drought**, for which there was evidence of moderate to heavy impact on 45% of soil problem sites (but also present at 21% of sites meeting Standard 1). Drought effects from the 2000-2002 drought were observed mainly as dead or low vigor trees and shrubs, which likely lost ground to the more drought-resistant annual weeds
- * **Seral stage issues** were documented to have moderate to heavy impact on 44% of soil problem sites (but also present at 14% of sites meeting Standard 1). Many of these sites were dominated by exotic, annual species which tie up the site and interfere with natural successional processes and seral stage transitions

The only factor which appears to be more common on the healthier soils in the landscape unit is **historic wildlife use** (but was also present on 11% of sites with soil health problems.)

Site-Specific Contributing Factors

These additional factors are contributing to soil

health status at the site level. Each factor is shown along with the percentage of soil problem sites at which it was found at moderate or high levels. Cases where the factor appears compatible with land health (was found at moderate or high levels at sites which meet Standard 1) is shown as a second percentage.

- * Historic cultivation (6%, 1%)
- * Erosion from uplands (5%, 0%)
- * Wildfire (11%, 10%)
- * Fire suppression (11%, 10%)
- * Historic livestock grazing (67%, 53%)
- * Current wildlife use and/or livestock grazing-33%, 41%)
- * Nearby agricultural or residential (5%, 17%)
- * OHV off-route use (11%, 5%)
- * Pinyon-juniper invasion (23%, 18%)
- * ROWs (excluding roads) (5%, 5%)
- * BLM routes (17%, 4%)
- * Old vegetation treatments (6%, 8%)

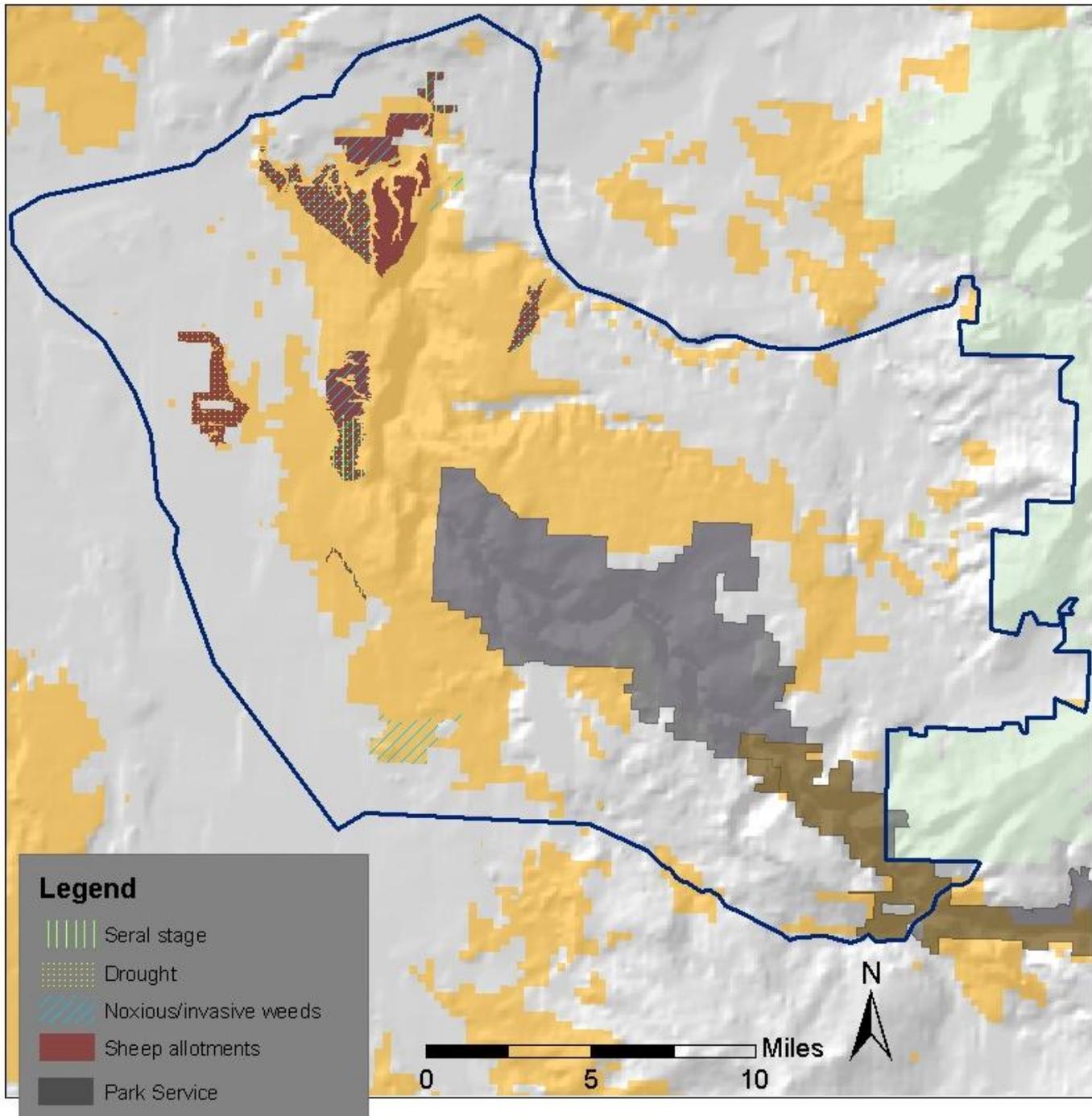
Development Analysis

The following types of developments, authorizations and user-created sites were sometimes found to be associated with land health and soil indicator concerns at the site level:

- * Abandoned mines
- * BLM authorized routes
- * BLM closed routes
- * Campsites
- * Cattleguards and Corrals
- * Contour furrows and check dams
- * Developed recreation sites
- * Gas wells
- * Mineral development
- * Road and highway Rights of Way

It may be possible to find ways to reduce future soil health impacts from these types of developments through more attention to design, construction, compliance and maintenance. In addition, there may be cases where some of these developments are adding incrementally to soil concerns that were identified in the lands not meeting Standard 1, or meeting with problems.

Figure 14. Landscape level causal factors and lands with soil health concerns in the Gunnison Gorge unit.



Causal Factors

Causal Factor	Acres	Percent of Problem Area
Seral Stage	1,647	13%
Drought	5,501	45%
Noxious or invasive weeds	8,110	66%
Sheep allotments	10,213	84%
Total Acres	12,216	100%

STANDARD 2 RIPARIAN: CAUSAL FACTORS

Definition: *Landscape-level causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with riparian health problems, and therefore are likely impacting riparian health most broadly across the Gunnison Gorge unit. Site-specific contributing factors are defined as the remaining conditions observed at moderate or higher levels at individual study sites which have riparian health problems. Development analysis identifies possible links between developments and riparian health.*

Landscape Level Causal Factors

Within the Gunnison Gorge unit, the following factors were found to occur much more frequently in lands not meeting Standard 2 or meeting with problems. We can conclude that they are at least partly responsible for current conditions, although they were compatible with some sites meeting Standard 2 (% shown in parenthesis).

- * **Flow regulation from dams**, which was documented at moderate or high levels on 100% of riparian problem sites (but was also present at 75% of sites meeting Standard 2). Flow regulation impacts were most notable on the Upper Gunnison, which is entirely controlled by releases from the Aspinall project dams. Other dams such as at Paonia Reservoir, Crawford and Gould Reservoirs have caused less departure from the historic flow regimes.
- * **Water diversions** were present on 100% of sites with riparian problems (but were also present at 63% of sites meeting Standard 2). Some level of water diversion is typical on most streams throughout the region, but amounts and irrigation return locations vary, causing different levels of impact.

Factors which are more common on the healthier riparian areas in the landscape unit include:

- * **Augmented flow** which occurred at 51% of healthy riparian areas, (and was not present on sites with riparian health problems.) Augmented flows are due to rerouting of natural drainage patterns to support irrigation and drainage needs, and cause greater flows in channels than would normally occur. However, these did not substantially affect stream channel or vegetation conditions..
- * **Intermittent flow** which occurred at 38% of healthy riparian sites (and was not present on sites with riparian health problems.) Many channels in the region do not support perennial flows, and some types of riparian vegetation are adapted to withstand this. Beaver have also buffered the effects of intermittent flows, and maintained stream functionality in the unit.

- * **Irrigation tailwater** was present at 25% of healthy riparian sites (and was not present on sites with riparian health problems.) This can have the same effects as augmented flow.
- * **Nearby agricultural or residential lands** were present at 38% of sites (and were not present on sites with riparian health problems.) While these can be a source of weeds, riparian vegetation in the region is still largely dominated by native species so that vegetation functionality has been maintained in such areas.
- * **Wildlife use** was present at substantial levels at 88% of sites, and was not present at substantive levels on sites with health problems. Native riparian vegetation has developed in association with wildlife—especially beaver—impacts, and healthy systems can support high levels of use. Conversely, heavy use indicates good habitat quality.

Site-Specific Contributing Factors

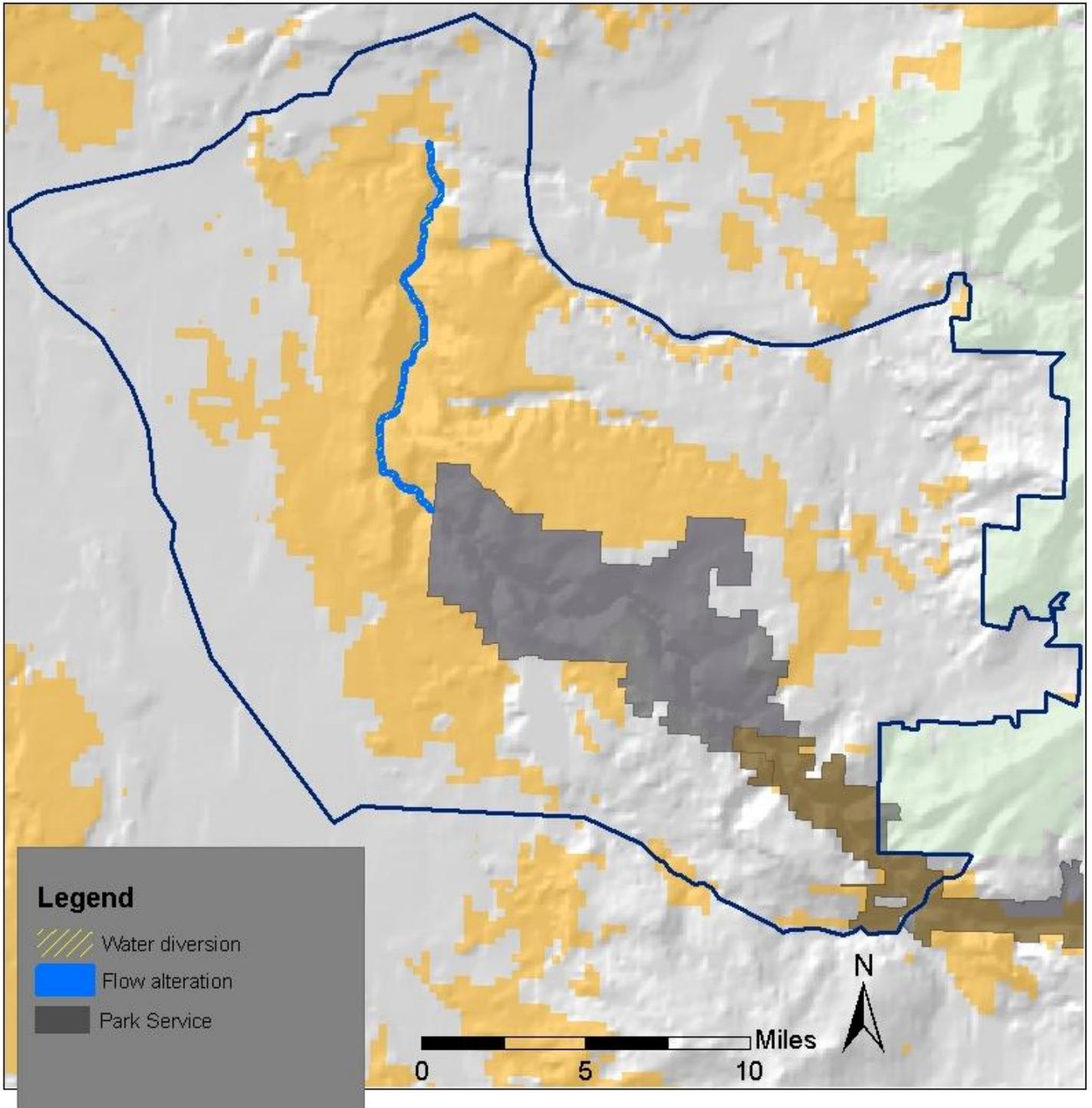
These additional factors are contributing to riparian health status at the site level. Each factor is shown along with the percentage of riparian problem sites at which it was found at notable levels. Cases where the factor appears compatible with land health (was found at substantive levels at sites which meet Standard 2) is shown as a second percentage.

- * **Noxious or invasive weeds** (50%, 50%)

Development Analysis

Sampled developments had very minor impacts on riparian indicator conditions. Only a limited number of campsites were found to impact riparian vegetation, and even fewer impacted stream erosion. Nevertheless, there may be cases where some of these developments are adding incrementally to riparian concerns that were identified in the lands meeting Standard 2 with problems.

Figure 15. Landscape level causal factors and lands with riparian health concerns in the Gunnison Gorge unit.



Causal Factor	Acres	Percent of Riparian
Flow regulation / dams	539	100%
Water diversions	539	100%
Total Acres	539	100%

STANDARD 3 NATIVE COMMUNITIES: CAUSAL FACTORS

Definition: *Landscape-level causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with plant and animal community health problems, and therefore are likely impacting community health most broadly across the Gunnison Gorge unit. Site-specific contributing factors are defined as the remaining conditions observed at moderate or higher levels at individual study sites which have community health problems. Development analysis identifies possible links between developments and plant and animal community health.*

Landscape Level Causal Factors

Within the Gunnison Gorge unit, the following factors were found to occur much more frequently in lands not meeting Standard 3 or meeting with problems. We can conclude that they are at least partly responsible for current conditions, although they were compatible with some sites meeting Standard 3 (% shown in parenthesis).

- * **Noxious and invasive plants** which were documented at moderate or high levels on 65% of Standard 3 problem sites (but were also present at 9% of sites meeting Standard 3). These weeds can dominate plant communities because they lack the natural diseases and predators to keep them in check. Once weeds dominate, the communities no longer provide the ecosystem services or habitat that native plant communities provide.
- * **Sheep grazing allotments** encompass 53% of the sites with plant and animal community health problems (but are also present at 15% of sites meeting Standard 3). These have been permitted for sheep grazing for at least several decades. Areas within the allotments where sheep have concentrated are often dominated by nonnative annuals and have low levels of native, perennial species. These areas are frequent enough in the sheep allotments to be detectable at a landscape level.

There are no factors which are consistently more common in the healthy plant and animal communities in the landscape unit.

Site-Specific Contributing Factors

These additional factors are contributing to community health status at the site level. Each factor is shown along with the percentage of Standard 3 problem sites at which it was found at notable levels. Cases where the factor appears compatible with land health (was found at substantive levels at sites which meet Standard 3) are shown as a second percentage.

- * Historic cultivation (5%, 0%)
- * Drought (30%, 15%)
- * Erosion from uplands (2%, 0%)

- * Wildfire (7%, 18%)
- * Fire suppression (9%, 15%)
- * Irrigation tailwater (6%, 0%)
- * Current livestock / wildlife grazing (31%, 44%)
- * Historic grazing (61%, 44%)
- * Mining (2%, 0%)
- * Nearby agriculture or residential (18%, 12%)
- * OHV off-route use (10%, 0%)
- * Pinyon-juniper invasion (20%, 21%)
- * Nearby stock ponds (2%, 3%)
- * ROWs (excluding roads) (9%, 0%)
- * BLM routes (11%, 3%)
- * Road and highway ROWs (4%, 0%)
- * Seral stage issues (20%, 21%)
- * New vegetation treatments (9%, 24%)
- * Old vegetation treatments (12%, 0%)
- * Historic wildlife use (34%, 53%)
- * Woodcuts (2%, 6%)

Development Analysis

The following types of developments, localized use authorizations and user-created sites were sometimes found to be associated with land health and plant and animal community indicator concerns at the site level:

- * Abandoned mines
- * BLM authorized routes (mainly from weeds and impacts to native plants)
- * BLM closed routes
- * Campsites
- * Cattleguards and Corrals
- * Communication sites
- * Contour furrows and check dams
- * Developed recreation sites
- * Ditch ROWs
- * Fences
- * Gas wells
- * Livestock ponds and reservoirs
- * Mineral development
- * Power and telephone ROWs
- * Road and highway ROWs
- * Spring developments

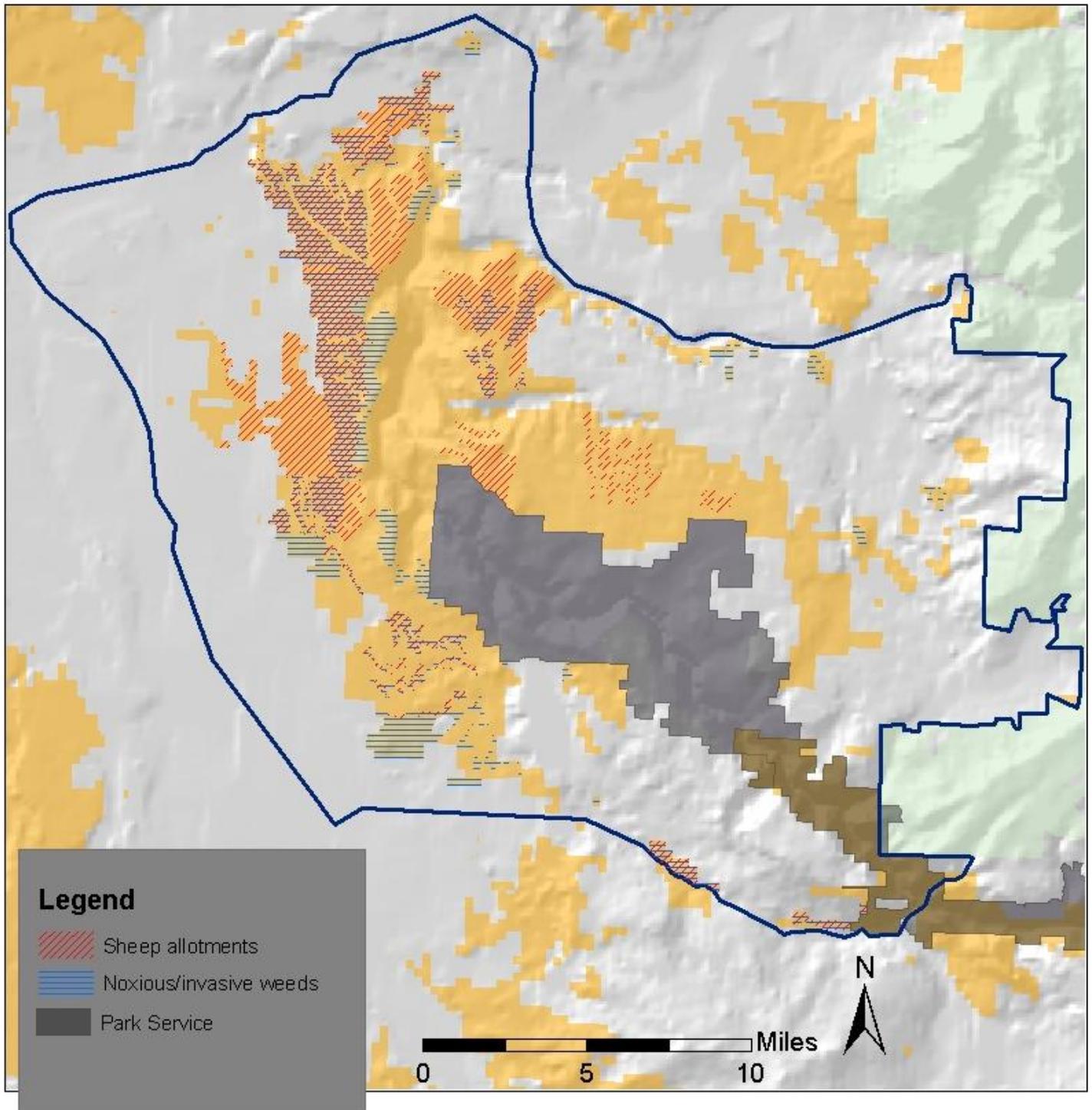
It may be possible to find ways to reduce future

STANDARD 3 NATIVE COMMUNITIES: CAUSAL FACTORS

community health impacts from these types of developments through more attention to design, construction, compliance and maintenance. In addition, there may be cases where some of the developments are adding incrementally to concerns that were identified in the lands not meeting Standard 3, or meeting with problems.

Figure 16. Landscape level causal factors and lands with plant and animal community health concerns in the Gunnison Gorge unit.

Causal Factors



Causal Factor	Acres	Percent of Problem Area
Noxious/invasive weeds	22,591	55%
Sheep grazing allotments	29,519	72%
Total Acres	40,791	100%

STANDARD 4 SPECIAL STATUS SPECIES: CAUSAL FACTORS

Definition: Landscape-level causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with Special Status Species (TES) health problems, and therefore are likely impacting TES health most broadly across the Gunnison Gorge unit. Site-specific contributing factors are defined as the remaining conditions observed at moderate or higher levels at individual study sites which have TES health problems. Development analysis identifies possible links between developments and TES health.

Landscape Level Causal Factors

Within the Gunnison Gorge unit, the following factors were found to occur much more frequently in lands not meeting Standard 4 or meeting with problems. We can conclude that they are at least partly responsible for current conditions, although they were compatible with some sites meeting Standard 4 (% shown in parenthesis).

- * **Noxious and invasive plants** were present at 59% of sites with TES problems (but were also present at 4% of sites meeting Standard 4). These weeds degrade habitat value for TES species.
- * **Domestic sheep grazing allotments** encompassed 51% of sites with TES problems (but were also present at 8% of sites meeting Standard 4). Areas within the allotments where sheep have concentrated are often dominated by nonnative annuals and have low levels of native, perennial species. These areas are frequent enough in the sheep allotments to be detectable at a landscape level. This degrades habitat quality for sensitive plant species.
- * **Historic livestock grazing** was a probable cause for conditions at 63% of sites with TES problems (but was also a factor at 32% of sites meeting Standard 4). Heavy historic grazing use around the Uncompahgre Valley has had long lasting impacts to the soils and vegetation, particularly in the drier sites. These vegetation changes can degrade TES habitat (but was also present at 32% of sites meeting Standard 4.)
- * **Flow regulation from dams** was noted at 100% of sites with aquatic TES problems (but was also present at 71% of aquatic habitat sites meeting Standard 4). Temperature and flow alterations that result from the dams reduce habitat quality for sensitive warm water fish species downstream.
- * **Recreation impacts (other than OHVs)** were found at 20% of aquatic habitat sites with TES problems. However, this is related to the excellent nonnative trout fishery that is now possible due to the dam upstream, and not a cause of

degraded TES habitat.

There are no factors which are consistently more common in areas of healthy terrestrial TES habitat in the landscape unit, but there are some factors associated with aquatic TES habitat. These include augmented flow, the presence of nearby agriculture, intermittent flow and upstream water quality. Rather than causing healthy conditions, however, these factors coincidentally occur along the streams which had no health issues.

Site-Specific Contributing Factors

These additional factors are contributing to community health status at the site level. Each factor is shown along with the percentage of Standard 4 problem sites at which it was found at notable levels. Cases where the factor appears compatible with land health (was found at substantive levels at sites which meet Standard 4) are shown as a second percentage.

- * Historic cultivation (3%, 0%)
- * Drought (26%, 20%)
- * Erosion from uplands (2%, 0%)
- * Wildfire (10%, 16%)
- * Fire suppression (9%, 16%)
- * Irrigation tailwater (5%, 0%)
- * Combined livestock and wildlife use (40%, 37%) (this data can be broken down within the Gunnison Sage Grouse ACEC into cattle grazing (44%, 25%) and deer/elk/wild and domestic sheep grazing (94%, 75%))
- * Mining (2%, 0%)
- * Nearby agriculture or residential (17%, 12%)
- * OHV off-route use (10%, 0%)
- * Pinyon-juniper invasion (21%, 16%)(within the Gunnison Sage Grouse ACEC: 32%, 25%)
- * Nearby stock ponds (2%, 4%)
- * ROWs (excluding roads) (6%, 4%)
- * BLM routes (8%, 4%)(within the Gunnison Sage Grouse ACEC: 6%, 0%)
- * Road and highway ROWs (4%, 0%)
- * Seral stage issues (22%, 16%)(within the

STANDARD 4 SPECIAL STATUS SPECIES: CAUSAL FACTORS

- Gunnison Sage Grouse ACEC: 31%, 25%)
- * New vegetation treatments (17%, 8%)
- * Old vegetation treatments (11%, 0%)
- * Historic wildlife use (36%, 52%)
- * Woodcuts (3%, 4%)

For aquatic TES species, contributing factors include:

- * Augmented streamflow (20%, 43%)
- * Irrigation tailwater (20%, 14%)
- * Noxious/invasive weeds (60%, 43%)
- * Water diversions (80%, 71%)

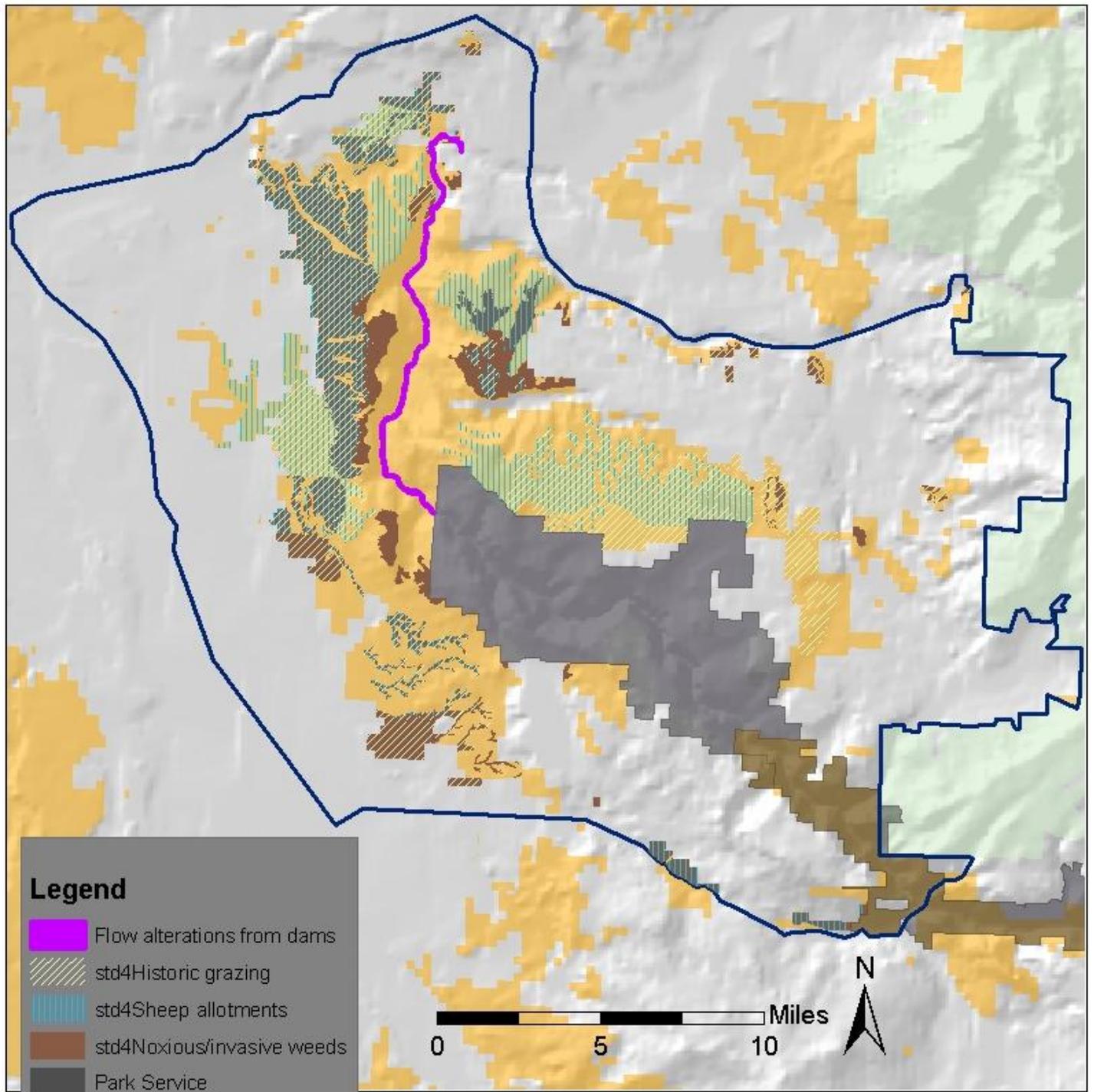
Development Analysis

The following types of developments, localized use authorizations and user-created sites were sometimes found to be associated with land health and TES indicator concerns at the site level:

- * Abandoned mines
- * BLM authorized routes
- * BLM closed routes (a significant issue for TES plants)
- * Routes within the Sage-grouse ACEC are causing detrimental disturbance to birds as well as erosional impacts to vegetation in some places.
- * Fences
- * Road and highway ROWs

It may be possible to find ways to reduce future TES health impacts from these types of developments through more attention to design, construction, compliance and maintenance. In addition, there may be cases where some of the developments are adding incrementally to concerns that were identified in the lands not meeting Standard 4, or meeting with problems.

Figure 17. Landscape level causal factors and lands with TES health concerns in the Gunnison Gorge unit.



Causal Factors

Causal Factor	Acres	Percent of Problem Area
Historic livestock grazing	33,730	72%
Noxious/invasive weeds	23,108	50%
Sheep grazing allotments	32,452	70%
Flow alterations from dams	585	1%
Total Acres	46,432	100%

STANDARD 5 WATER QUALITY: CAUSAL FACTORS

Definition: *Landscape-level causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with water quality problems, and therefore are likely impacting water quality most broadly across the Gunnison Gorge unit. Site-specific contributing factors are defined as the remaining conditions observed at moderate or higher levels at individual study sites which have water quality problems. Development analysis identifies possible links between developments and water quality.*

Landscape Level Causal Factors

Within the Gunnison Gorge unit, the following factors were found to occur much more frequently in lands not meeting Standard 5 or meeting with problems. We can conclude that they are at least partly responsible for current conditions, although they were compatible with some sites meeting Standard 5 (% shown in parenthesis).

- * **Augmented flow** which occurred at the only site with water quality problems (and was present on 60% of sites meeting water quality criteria.) Augmented flows are due to re-routing of natural drainage patterns to support irrigation and irrigation runoff.
- * **Irrigation tailwater** which was found at the one site with water quality problems (but was also found at 40% of sites meeting Standard 5.) Irrigation tailwater carries sediment, agricultural chemicals, nutrients, and salts leached from the soils of irrigated areas into the receiving stream.

Several factors were consistently more common at the sites with good water quality. These included: flow regulation from dams, intermittent streamflow, nearby agricultural lands, noxious and invasive weeds, recreation impacts (not related to OHV use), upstream channel conditions, water diversions and wildlife use. While these are probably not responsible for the water quality on site, their presence indicates that they can be compatible with good water quality in the landscape unit.

Site-Specific Contributing Factors

- * No additional factors appeared to be contributing to water quality at the site level.

Development Analysis

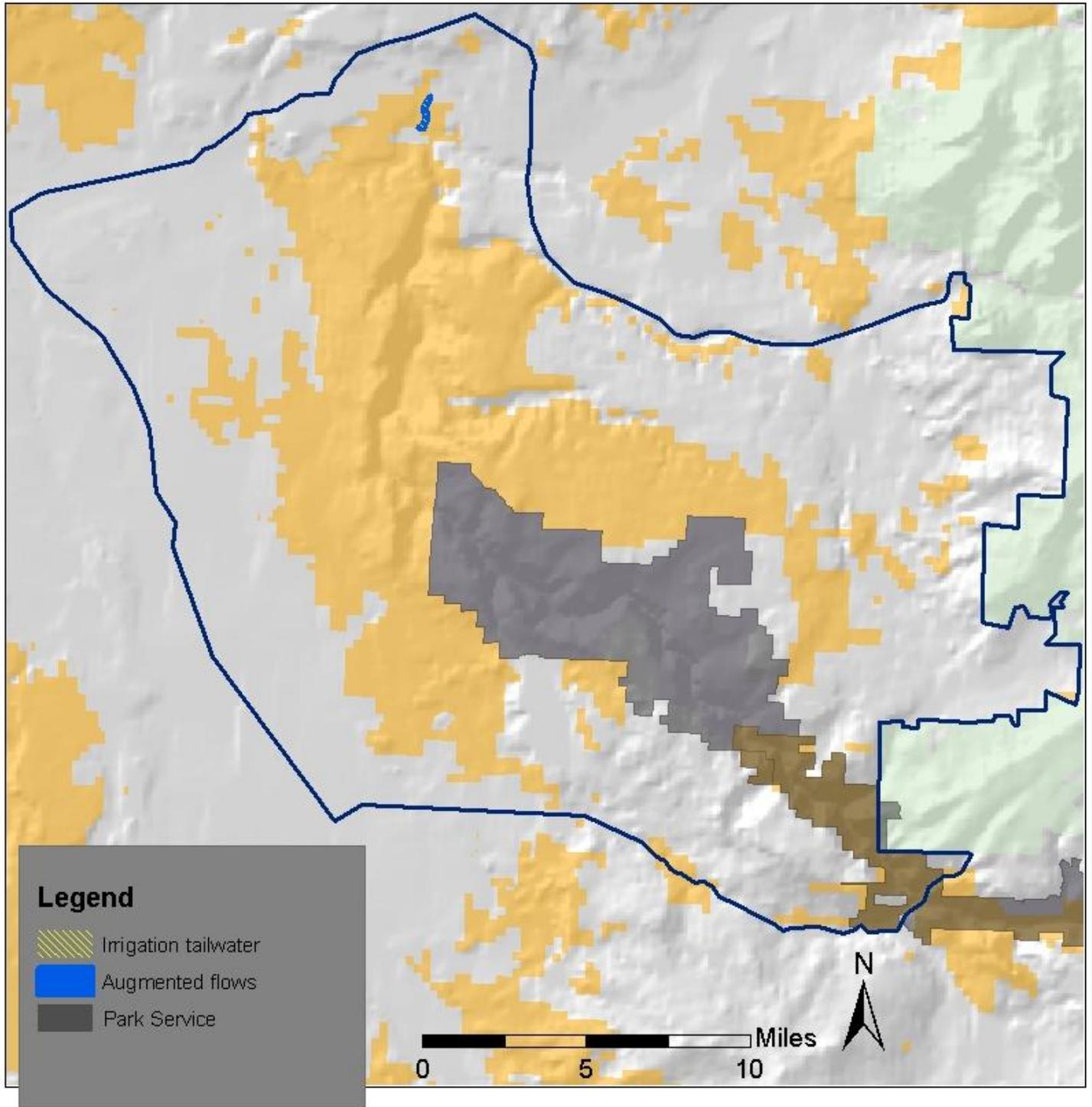
The following types of developments, localized use authorizations and user-created sites were sometimes found to be associated with land health and water quality concerns at the site lev-

el:

- * Abandoned mines
- * BLM authorized routes
- * BLM closed routes
- * Campsites
- * Contour furrows and check dams
- * Developed recreation sites
- * Gas wells and pads
- * Livestock ponds
- * Road and highway ROWs

It may be possible to find ways to reduce future water quality impacts from these types of developments through more attention to design, construction, compliance and maintenance. In addition, there may be cases where some of the developments are adding incrementally to concerns that were identified in the lands not meeting Standard 5.

Figure 18. Landscape level causal factors and lands with water quality concerns in the Gunnison Gorge unit.



Causal Factor	Acres	Percent of Problem Area
Flow regulations-dams	52	100%
Noxious and invasive weeds	52	100%
Total Acres	52	100%



A variety of factors affect land health determinations. Some of them are outside the control of BLM management, as shown in the top photo portraying water quality at the outflow from Crawford Reservoir, which is managed by the Bureau of Reclamation. Other factors are legacies of management actions taken decades ago, as shown by the 1960's era contour furrows in the bottom photograph.

REMEDIES: OVERVIEW

Definition: Remedies are the management actions which are needed to fix the land health problems that have been identified. They may directly address causal factors, or may simply repair damage on the ground. Remedies may take the form of revised stipulations or terms in permitted activities, proposed projects along with necessary budget requests and Proposed Action statements, or updated best management practices. Remedies may also take the form of monitoring, research, or enforcement, maintenance and compliance activities added to the Annual Work Plan (AWP), or daily work activities.

Explanation of Approach:

This Land Health Assessment is designed to promote improvement of land health conditions in the Gunnison Gorge Unit, at both the landscape level and smaller scales. A systematic approach was followed to identify landscape scale land health remedies and small scale actions to reduce impacts to land health that relate to developments.

Landscape Scale Remedies:

These remedies are directed at fixing large scale problems which were identified during the Land Health Determinations. The approach starts with identification of the types and locations of land health problems in the Determinations section. Next, the causal factors related to the problems are identified as discussed in the Causal Factor section. Finally, remedies to address each of the causal factors are identified. This approach has been used to maintain a direct linkage between suggested remedies and the specific land health problems, and to ensure that a comprehensive list of remedies is developed.

A total of 34 separate remedies have been identified. Some of these apply to more than one Land Health Standard. The remedies are listed for each Standard on the following pages. Where a remedy applies to more than one Standard, a cross reference is made. The linkage between problem, cause and remedy can be found in the remedy tables for each Standard in Appendix A.

Small Scale Actions:

Within areas determined to have land health problems, many site-specific actions can be taken to promote movement toward land health. Most of these actions involve developments or land use authorizations, and making sure they are not conflicting with movement toward land health. While BLM acknowledges the history of past land use and prior existing rights may make some changes impossible or impractical, there are many situations where improvements can be made.

Small scale actions typically involve a field visit to lands determined to have health problems and evaluation of certain types of developments or authorizations within those areas. Evaluation is only needed for those types of developments or authorizations which the Development Analyses suggests may impact land health at the site level. When individual developments are reviewed in the field, compliance, maintenance, and design would be evaluated to ensure that impacts to the problem indicators are minimized. Follow-up actions would be taken where appropriate. These would likely involve modification of the design, improved compliance with authorizations, or necessary maintenance.

STANDARD 1 SOILS: REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 1 soil indicators which showed problems (see Determinations Standard 1 section). The remedies were developed through consideration of landscape level causal factors associated with problem indicators (see Appendix A1.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.*

Land Health Remedies

Apply the following landscape level actions within these priority areas:

Figure 14: mapped areas

Allotments: Black Canyon/Jones Draw, Brush Point, Cedar Point, Collins, East Gould Reservoir, Green Mountain, Onion Valley, Rim Rock, Selig Canal, Upper Peach Valley

Vegetation Types: Mountain Shrub, Pinyon-Juniper

Vegetation Treatments: wildfire, untreated vegetation

Special Areas: Peach Valley-Flattop SRMA, Gunnison Gorge Wilderness:

- Ensure livestock grazing permit terms include: appropriate seasonal utilization limits (or reduced limits where there are long standing problems), active growing season duration limits that minimize use of regrowth, a mechanism to incorporate rest, rest for vegetation treatments where needed to achieve health objectives, restricted spring and fall grazing of the same area within the same year unless it achieves other health objectives, and drought mitigation measures including reduced utilization limits. Sheep allotments need terms which control soil disturbing activities. (1A)
- Improve compliance with grazing permit terms through increasing utilization monitoring. Additional data will help us take action when data shows we have a problem (1B)
- Continue weather and climate monitoring to be better prepared for droughts and correspondingly modify management early in the drought (1C)
- Revegetate or restore areas that have been dominated by annual weeds or introduced species (1D)

- Increase level of weed management for those species which threaten soil health (knapweeds, cheatgrass, alyssum, halogeton) (1E)
- Reduce amounts of early and late-mid seral stages, and areas with cryptogam cover problems which lead to soil loss (1F)
- Manage fire to better simulate the natural disturbance regime as much as possible- review and update UFO Fire Plan to incorporate this direction (1G)
- Treat vegetation to simulate fire effects, promote use of managed fire, and achieve a more natural mosaic of seral stages (1H)
- Improve monitoring of surface disturbance, both at the project level and cumulatively across the landscape (1I)

Additional actions will be needed to address soil health problems and the factors which contribute to them at the site level. When working within a Land Health polygon that has soil problems, refer to the contributing factors, identify whether or not they are present on the site, and address them using the NEPA process. During project design and development of design features, ensure that each contributing factor is addressed and will be compatible with the site regaining soil health.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas assess the following developments for condition and compliance relative to Standard 1 indicators. At each site, identify what action is needed to minimize impacts to soil indicators. Developments in lands not meeting Standard 1 are the top priority, while developments in lands meeting Standard 1 with problems are the second priority. Many priority sites

STANDARD 1 SOILS: REMEDIES

are identified in GIS layers which are all stored in the following directory:

T:\CO\GIS\giswork\luf\projects\vegetation\Land Health Assessments\ Gunnison_Gorge_ Landscape_LHA\GGLHA implementation layers\

Top Priority:

BLM routes: Address for water erosion and groundcover indicators 2 miles in GIS layer:
Std1_top_priority_routes_clip.shp

Second Priority:

BLM routes: Address for water erosion and groundcover indicators 60 miles in GIS layer:
Std1_second_priority_routes_clip.shp

Contour furrows and check dams: Address for groundcover, water and wind erosion indicators Peach Valley Check Dams project RIPS# 231252

Developed recreation sites: Address for ground cover indicators Eagle Valley Trailhead, Flat Top Staging Area, Gunnison Forks Overlook, Lawhead Gulch Trailhead, and Smith Mountain Saddle Parking Area

Gas wells: Address for water erosion and groundcover indicators plugged and abandoned wildcat wells 05-029-05018, 05-029-06067

Mineral development: Address for groundcover and water and wind erosion indicators abandoned Gravel Pit T14S, R94W S36

Road and Highway Rights of Way: Address for groundcover and water erosion indicators 4 miles of road ROWs in Montrose County in GIS layer
Std1_second_priority_Montrose_CO_ROW_clip.shp
10 miles of road ROWs in Delta County in GIS layer
Std1_second_priority_Delta_CO_ROW_clip.Shp
8 miles of other non-county road ROWs in GIS layer
Std1_second_priority_road_ROWs_clip.shp

STANDARD 2 RIPARIAN: REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 2 riparian indicators which showed problems (see Determinations Standard 2 section). The remedies were developed through consideration of landscape level causal factors, and in some cases contributing factors associated with problem indicators (see Appendix A2.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.*

Land Health Remedies

Apply the following landscape level actions to these priority areas:

Figure 15: mapped areas

Allotments: Crawford Reservoir, Dedication Site, Iron Canyon, Rawhide/Coffeepot

Streams: Iron Canyon, Muddy Creek, Rawhide Gulch, Upper Gunnison River

Special Areas: GGNCA, Gunnison Gorge Wilderness

- Work with the Bureau of Reclamation and attend Aspinall Management Meetings to show BLM support for flows that will best simulate the natural hydrograph (2A)
- If opportunities arise on management of other reservoirs, show BLM support for flows that will best simulate the natural hydrograph (2B)
- Increase management level of Colorado A and B list weeds along riparian areas (2C)
- Continue the weed treatments along the different branches of the Gunnison River (Russian knapweed, Russian olive, tamarisk, yellow toadflax) to keep weed cover a minimal part of the riparian community (2D)
- Monitor effects of tamarisk beetle on tamarisk, and treat secondary weeds if they increase (2E)
- Continue active restoration of degraded riparian areas along the different branches of the Gunnison River (2F)

Additional actions will be needed to address riparian health problems and the factors which contribute to them at the site level. When working within a Land Health polygon that has riparian problems, refer to the contributing factors, identify whether or not they are present on the site, and address them using the NEPA process.

During project design and development of design features, ensure that each contributing factor is addressed and will be compatible with the site regaining riparian health.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas assess the following developments for condition and compliance relative to Standard 2 indicators. At each site, identify what action is needed to minimize impacts to riparian indicators. Developments in lands meeting Standard 2 with problems are the top priority.

Top Priority:

BLM campsites: Address riparian vegetation and channel erosion indicators at 25 boater campsites along the Upper Gunnison River, particularly for willows. Resolve campsite conflicts with riparian vegetation, recreation management objectives, design issues, and closed area violations along lower Gunnison River.

STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES: REMEDIES

Definition: Land Health remedies are corrective actions which specifically address those Standard 3 plant and animal community indicators which showed problems (see Determinations Standard 3 section). The remedies were developed through consideration of landscape level causal factors associated with problem indicators (see Appendix A3.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.

Land Health Remedies

Apply the following actions to these priority areas:

Figure 16: mapped areas

Allotments: Adobe, Adobe South, Allen Reservoir, Big Gulch, Big Gulch 40, Big Pasture, Black Bullet, Black Canyon/Jones Draw, Black Ridge, Bostwick Park, Brush Point, Cedar Creek, Cedar Point, Collins, Crawford Reservoir, Dead Horse Common, Dedication Site, East Gould Reservoir, Fruitland Mesa, Gould Reservoir, Green Mountain, Grizzly Gulch, Iron Canyon, Middle Peach Valley, Needle Rock, Onion Valley, Pinyon Springs, Poison Spring, Rabbit Gulch, Rawhide/Coffeepot, Red Canyon, Rim Rock, Selig Canal, Shamrock, Smith Fork Individual, Smith Mountain, Spring Gulch, Sulphur Gulch, Upper Peach Valley, and the grass bank

Vegetation Types: Grass-forb, mountain shrub, pinyon-juniper, sagebrush, salt-desert shrub

Vegetation treatments: Brushbeat, PJ removal, plow and seed, prescribed fire, rollerchop, wild-fire, and untreated vegetation

Special Areas: Fairview ACEC, Peach Valley Flattop SRMA, GGNCA, Gunnison Gorge Wilderness, Gunnison River SRMA, Gunnison Sage Grouse ACEC, and Native Plant ACEC. The actions are listed in no particular order of priority:

- Increase weed management efforts on A and B list species, and annual exotic plants like cheatgrass, jointed goatgrass, alyssum and halogeton (3C)
- Seed disturbances with desirable native species to prevent weeds from becoming established (3A)
- Revegetate or restore areas that have been dominated by annual weeds or introduced species (same as 1D)
- Ensure livestock grazing permit terms include appropriate seasonal utilization limits (or reduced limits where there are long standing

problems), active growing season duration limits, incorporate rest, provide for rest of vegetation treatments, minimize spring and fall grazing of the same area within the same year, and drought mitigation measures (same as 1A)

- Increase compliance monitoring and enforcement of grazing permit terms (same as 1B)
- Reduce sheep concentration impacts by improving management of sheep camps, trailing, watering and bedding areas (3B)

Additional actions will be needed to address plant and animal community health problems and the factors which contribute to them at the site level. When working within a Land Health polygon that has plant or animal community problems, refer to the contributing factors, identify whether or not they are present on the site, and address them using the NEPA process. During project design and development of design features, ensure that each contributing factor is addressed and will be compatible with the site regaining plant and animal community health.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas assess the following developments for condition and compliance relative to Standard 3 indicators. At each site, identify what action is needed to minimize impacts to plant and animal indicators. Developments in lands not meeting Standard 3 are the top priority, while developments in lands meeting Standard 3 with problems are the second priority. Many priority sites are identified in GIS layers which are all stored in the following directory:

T:\CO\GIS\giswork\ufo\projects\vegetation\Land Health Assessments\ Gunnison_Gorge_Landscape_LHA\GGLHA implementation layers\

STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES: REMEDIES**Top Priority:**

BLM routes: address for native vegetation and weed indicators 89 miles in GIS layer:
Std_3_top_priority_routes_clip.shp

Communication sites: address for native vegetation and weed indicators COC 059910

Contour furrows and check dams: address for connectivity, wildlife, native vegetation and weed indicators Peach Valley Check Dams Rips# 231252

Developed recreation sites: address for native vegetation and weed indicators Eagle Road Parking, Eagle Valley Trailhead, Gunnison Forks Overlook, Lawhead Gulch Trailhead, Wave/Eagle Connector Parking

Fences: Address for connectivity, wildlife and weed indicators. Need to be GPS'd

Gas wells: address for native vegetation and weed indicators wildcat well # 5-029-0518

Livestock ponds and reservoirs: address for native vegetation and weed indicators 12 undocumented ponds (not in the RIPS database) in GIS layer: Std3_top_priority_ponds.shp

Mineral development: address for native vegetation and weed indicators abandoned Gravel Pit T14S, R94W S36

Power and telephone ROWs: address for connectivity, native vegetation and weed indicators 0.1 miles of Powerline COC 039188 and Telephone COC 039186 In GIS layer
Std_3_top_priority_power_phone_ROWs_clip.shp

Road and highway ROWs:
address for connectivity, wildlife, native vegetation and weed indicators 12 miles of road ROWs in Montrose County in GIS layer
Std_3_top_priority_Montrose_CO_ROW_clip.shp
5 miles of road ROWs in Delta County in GIS layer
Std_3_top_priority_Delta_CO_ROW_clip.shp
4 miles of other non-county road ROWs in GIS

layer Std3_top_priority_road_ROWs_clip.shp

Second Priority:

Abandoned mines: address for weeds and native vegetation indicators 1 site ID# 2419 Bentonite Claims

BLM routes: address for native vegetation and weed indicators 156 miles in GIS layer: Std_3_second_priority_routes_clip.shp

Cattleguards and Corrals: address for wildlife, native vegetation and weed indicators Peach Valley Cattleguard #236159, Green Mtn Corral #231281

Communication sites: address for wildlife, native vegetation and weed indicators 3 locations on Flattop for COC#s 038358, 064601, 031469, 055475, 058093, 017252, 069163

Contour furrows and check dams: address for connectivity, wildlife, native vegetation and weed indicators Peach Valley Check Dams Rips# 231252

Developed recreation sites: address for native vegetation and weed indicators Bobcat Trailhead, Carnation Trailhead, Flat Top Staging Area, North Sidewinder Trailhead, Peach Valley OHV staging Area, Smith Mountain Saddle Parking Area

Ditch ROWs: address for native vegetation and weed indicators 2 miles of COD 0035896 in GIS layer
Std_3_second_priority_Ditch_ROWs_clip.shp

Fences: Address for connectivity, wildlife and weed indicators. Need to be GPS'd

Gas wells: address for native vegetation and weed indicators drilled and abandoned wildcat wells #05-085-05048 and #05-085-05049

Livestock ponds and reservoirs: address for native vegetation and weed indicators 3 ponds documented in RIPS Klenda Reservoir #231405, Green Mountain #230323, Lower Peach Valley dam #230277, and 9 undocumented ponds in GIS layer Std3_second_priority_ponds.shp

STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES: REMEDIES

Mineral development: address for native vegetation and weed indicators 1 mineral material site
COC 73888

Power and telephone ROWs: address for connectivity, native vegetation and weed indicators 12 miles combined of powerline COC 16957, 039188, 035382, 055908, 041150, 022713 and phone line COC 039186, 055802, 053003, 036712, and 039185 in GIS layer
Std_3_second_priority_power_phone_ROW_clip.shp

Road and highway ROWs: address for wildlife, connectivity, native vegetation and weed indicators 15 miles of road ROWs in Montrose County in GIS layer
Std_3_second_priority_Montrose_CO_ROW_clip.shp
14 miles of road ROWs in Delta County in GIS layer Std_3_second_priority_Delta_CO_ROW_clip.shp
12 miles of other non-county road ROWs in GIS layer
Std_3_second_priority_road_ROW_clip.shp

STANDARD 4 SPECIAL STATUS SPECIES (TES): REMEDIES

Definition: Land Health Remedies are corrective actions which specifically address those Standard 4 TES indicators which showed problems (see Determinations Standard 4 section). The remedies were developed through consideration of causal and contributing factors associated with problem indicators for Standard 2 and Standard 3 (see Appendix A2.6 and 3.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.

Land Health Remedies

Apply the following actions to these priority areas:

Figure 17: mapped areas

Allotments: Adobe South, Big Gulch, Big Gulch 40, Big Pasture, Black Canyon/Jones Draw, Black Ridge, Brush Point, Cedar Creek, Cedar Point, Crawford Reservoir, Dedication Site, Gould Reservoir, Green Mountain, Grizzly Gulch, Iron Canyon, Middle Peach Valley, Needle Rock, Pinyon Springs, Poison Spring, Rabbit Gulch, Rawhide/Coffeepot, Red Canyon, Rim Rock, Selig Canal, Shamrock, Smith Fork Individual, Smith Mountain, Sulphur Gulch, Upper Peach Valley, and the grass bank

Vegetation Types: Grass-forb, mountain shrub, pinyon-juniper, sagebrush, salt-desert shrub

Vegetation treatments: brushbeat, PJ removal, plow and seed, prescribed fire, rollerchop, wild-fire, and untreated vegetation

Special Areas: Fairview ACEC, Peach Valley Flattop SRMA, GGNCA, Gunnison Gorge Wilderness, Gunnison River SRMA, Gunnison Sage Grouse ACEC, and Native Plant ACEC

Streams: Iron Canyon, Muddy Creek, North Fork of the Gunnison, Upper Gunnison

- Increase weed management efforts on A and B list species (2C)
- Implement an aggressive Russian knapweed and whitetop eradication program for the North Fairview ACEC.
- Work with Uncompahgre Valley Water Users Association to more actively manage weeds along the AB Lateral Ditch which flows through the North Fairview ACEC (4F)
- Seed disturbances with desirable native species to prevent weeds from becoming established (3A)
- Revegetate or restore areas that have been dominated by annual weeds or introduced

species (1D)

- Ensure livestock grazing permit terms include appropriate seasonal utilization limits (or reduced limits where there are long standing problems), active growing season duration limits, incorporate rest, provide for rest of vegetation treatments, minimize use of spring and fall grazing of the same area within the same year, and drought mitigation measures (1A)
- Increase compliance monitoring and enforcement of grazing permit terms (1B)
- Work with grazing permittees to avoid known locations of federally threatened plant populations during trailing and bedding (4G)
- Continue to survey for special status plants on Smith Mountain, Peach Valley area, and Native Plant ACEC (4A)
- Reduce sheep concentration impacts by improving management of sheep camps, trailing, watering and bedding areas (3B)
- Actively restore appropriate native forbs, shrubs and grasses to areas that were heavily grazed historically, focusing on TES habitat (4E)
- Conduct utilization studies after each domestic grazing rotation and again prior to lekking season to ascertain wildlife utilization levels (4H)
- Keep CPW aware of browse stand condition and wildlife use levels (4B)
- Work with CPW to maintain wild ungulate levels at or below population objectives (4I)
- Incorporate mitigating measures when revegetating fires or otherwise treating vegetation

STANDARD 4 SPECIAL STATUS SPECIES (TES¹): REMEDIES

to reduce damaging effects of elk, deer and prairie dog concentrations (4C)

- Include appropriate species, ecotype, and regionally appropriate variety of sagebrush seed when revegetating sagebrush areas unless objective is to create an early seral community (4D)
- Work with the Bureau of Reclamation and attend Aspinall Management Meetings to show BLM support for flows that will best simulate the natural hydrograph (2A)
- If opportunities arise on management of other reservoirs, show BLM support for flows that will best simulate the natural hydrograph (2B)

Development Analysis: Actions to Reduce Impacts to Land Health

The developments listed under Standard 2 and 3 Remedies section also apply to Standard 4.

- Conduct Travel Management analysis for the Gunnison Sage Grouse ACEC to assess seasonal closures and route reductions to address disturbance and erosion issues to TES species.
- Pursue opportunities to reduce OHV impacts to clay-loving buckwheat populations in the Carnation Road area.

Additional actions will be needed to address plant and animal community health problems and the factors which contribute to them at the site level. When working within a Land Health polygon that has plant or animal community problems, refer to the contributing factors, identify whether or not they are present on the site, and address them using the NEPA process. During project design and development of design features, ensure that each contributing factor is addressed and will be compatible with the site regaining plant and animal community health.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas assess the following developments for condition and compliance relative to Standard 4 indicators. At each site, identify what action is needed to minimize impacts to TES indicators. Developments in lands not meeting Standard 4 are the top priority, while developments in lands meeting Standard 4 with problems are the second priority.

Top Priority:

Carnation Road Trailhead and OHV impacts: design and install appropriate protections for rare plants to stop ongoing impacts from vehicles (this is in an area rated as meeting Standard 4 with problems, but is considered the highest priority)

BLM routes: Address for TES habitat impacts 104 miles of BLM routes (especially the closed routes) in GIS layer Std_4_top_priority_routes_clip.shp

Fences: Address for hazards to TES species and habitat impacts. Need to be GPS'd

Road and highway ROWs: Address hazards to TES species and habitat impacts 10 miles of road ROWs in Montrose County in GIS layer Std_4_top_priority_Montrose_CO_ROW_clip.shp
9 miles of road ROWs in Delta County in GIS layer Std_4_top_priority_Delta_CO_ROW_clip.shp
3 miles of other non-county road ROWs in GIS layer Std4_top_priority_road_ROWs_clip.shp

Second Priority:

Abandoned mines: Address damage to TES habitat from Site 2419 Bentonite claims. Carry out validity exams for locatable minerals on placer claims.

BLM routes: Address for TES habitat impacts 198 miles of BLM routes (especially the closed routes and the routes in the Gunnison Sage Grouse ACEC) in GIS layer Std_4_second_priority_routes_clip.shp

STANDARD 4 SPECIAL STATUS SPECIES (TES¹): REMEDIES

Fences: Address for hazards to TES species and habitat impacts. Need to be GPS'd

Road and highway ROWs: Address hazards to TES species and habitat impacts on 22 miles of road ROWs in Montrose County in GIS layer

Std_4_second_priority_Montrose_CO_ROW_clip.shp

13 miles of road ROWs in Delta County in GIS layer Std_4_second_priority_Delta_CO_ROW_clip.shp

24 miles of other non-county road ROWs in GIS layer

Std4_second_priority_road_ROW_clip.shp

STANDARD 5 WATER QUALITY: REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 5 water quality indicators which showed problems (see Determinations Standard 5 section). The remedies were developed through consideration of landscape level causal and some contributing factors associated with problem indicators (see Appendix A5.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.*

Land Health Remedies

Apply the following actions to these priority areas:

Figure 18: mapped areas

Allotments: Black Ridge, Sulphur Gulch

Streams: North Fork Gunnison, Smith Fork, Sulphur Gulch

Special Areas: GGNCA, Gunnison Gorge Wilderness, Gunnison River SRMA The actions are listed in no particular order of priority:

- Identify where both surface and groundwater from irrigation runoff is entering BLM stream channels to prevent irrigation from entering key drainages and deep percolation (5A)
- Look at alternate drainages for tailwater return flow to prevent irrigation from entering key drainages and deep percolation (5B)
- Coordinate with Bureau of Reclamation on remediation strategies for water quality and riparian replacement mitigation (5C)
- Continue involvement with Selenium Task Force (5D)
- Complete road and route mapping for Gunnison Gorge LHA unit so that route densities can factor into future route designation activities (5E)

Additional actions will be needed to address water quality problems and the factors which contribute to them at the site level. These should be handled on a case-by-case basis, using the NEPA process. At that time, ensure that each contributing factor is addressed and will be compatible with the site regaining acceptable water quality.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas assess the following developments for condition and compliance relative to Standard 5 indicators. At each site, identify what action is needed to minimize impacts to water quality indicators. Developments in the subwatersheds around lands not meeting Standard 5 are the top priority.

Top Priority:

Evaluate water sources and drainage patterns between Redlands Mesa and the Lower Gunnison and North Fork Rivers. The primary water degradation concern is associated with groundwater movement through highly saline soils in this area. The source of this water is from irrigated private lands north of the NCA. Review the following map:

T:\CO\GIS\giswork\ufo\projects\vegetation\Land Health Assessments\Gunnison_Gorge_Landscape_LHA\GGLHA implementation layers\North GGNCA Ditch and Drainage patterns.pdf

Existing developments within the NCA were not evaluated for groundwater impacts, but are unlikely to be contributing to these problems.

Second Priority:

Actions to address water erosion under Standard 1 should benefit water quality (Standard 5) through reductions in sediment.